GENERAL GC DATA VALIDATION SUMMARY FOR DATA PACKAGE:
B09332-TMA-611 (923-E418, Filename B09325.GC)

06/1 4225 1990

MEMORANDUM

MAR 1994
RECEIVED
TQO

TO: 200-UP-2 Project QA Record March 4, 1994

FR: Susan Winter, Golder Associates Inc.

RE: GENERAL GC DATA VALIDATION SUMMARY FOR DATA PACKAGE: B09332-TMA-611 (923-E418, Filename B09325.GC)

## INTRODUCTION

This memo presents the results of data validation on data package B09332-TMA-611 prepared by the Thermo Analytical (TMA) laboratory. A list of samples validated along with the analyses reported and the method of analysis is provided in the following table.

| SAMPLE ID | SAMPLE DATE | MEDIA | ANALYSIS |
|---|---|---|---|
| B09332<br>B09333<br>B09336 | 09/09/93<br>09/10/93<br>09/10/93 | SOIL<br>SOIL<br>SOIL | SEE NOTE 1 |
| Note 1. All samples were analyzed for kerosene according to the 8015 Modified method. | | | |

Data validation was conducted in accordance with the WHC statement of work (WHC 1993a) and validation procedures (WHC 1993b). Attachments 1 through 5 provide the following information as indicated below:

Attachment 1. Glossary of Data Reporting Qualifiers
Attachment 2. Summary of Data Qualifications
Attachment 3. Qualified Data Summary and Annotated Laboratory Reports
Attachment 4. Laboratory Narrative and Chain-of-Custody Documentation
Attachment 5. Data Validation Supporting Documentation

MAR 1994

## DATA QUALITY OBJECTIVES

**Precision.** Goals for precision were met.

**Accuracy.** Goals for accuracy were met. However, the control limits for the matrix spike and matrix spike duplicate percent recoveries (MS/MSD %R) are not currently available and have been requested. The MS/MSD %R were 85% and 93%, respectively, therefore, no qualification was required since the recoveries were considered acceptable.

**Sample Result Verification.** All sample results were supported in the raw data.

**Detection Limits.** Detection limit goals were met for all sample results as specified in the reference analytical method.

**Completeness.** The data package was complete for all requested analyses. A total of three samples were validated in this data package with a total of 3 determinations reported, all of

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which were deemed valid. This results in a completeness of 100 percent, which meets normal work plan objectives of 90%.

## MAJOR DEFICIENCIES

No major deficiencies were identified during data validation which required qualification of data as unusable.

## MINOR DEFICIENCIES

No minor deficiencies were identified during data validation which required qualification of data.

## REFERENCES

WHC 1993a, Validation of 200-UP-2 Data, Statement of Work, Analytical Laboratory Data Validation, Task Order S-94-18, December 14, 1993, Purchase Order M073750. Westinghouse Hanford Company, Richland, Washington.

WHC 1993b, Data Validation Procedures for Chemical Analyses, WHC-SD-EN-SPP-002, Rev. 2, 1993. Westinghouse Hanford Company, Richland, Washington.

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ATTACHMENT 1

GLOSSARY OF DATA REPORTING QUALIFIERS

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GLOSSARY OF ORGANIC DATA REPORTING QUALIFIERS

B - Indicates the constituent was analyzed for and detected in the associated laboratory blank. This qualifier is applied by the laboratory. During the process of data validation this qualifier may be replaced by other appropriate qualifiers as defined by the validation procedures. The associated data should be considered usable for decision making purposes.

U - Indicates the constituent was analyzed for and not detected. The concentration reported is the sample quantitation limit corrected for aliquot size, dilution and percent solids (in the case of solid matrices) by the laboratory. The associated data should be considered usable for decision making purposes.

UJ - Indicates the constituent was analyzed for and not detected. Due to a minor quality control deficiency identified during data validation the concentration reported may not accurately reflect the sample quantitation limit. The associated data should be considered usable for decision making purposes.

J - Indicates the constituent was analyzed for and detected. This qualifier may be applied by the laboratory to indicate a concentration which is less than the contract required quantitation limit (CRQL) but greater than the instrument detection limit (IDL). During data validation this qualifier may be applied to indicate a minor quality control deficiency. However in either case, the associated data should be considered usable for decision making purposes.

NJ - Indicates presumptive evidence of a constituent at an estimated value. This qualifier is normally applied to GC analysis data (such as organochlorine pesticide and PCB data). The associated data should be considered usable for decision making purposes.

N - Indicates presumptive evidence of a constituent. This qualifier is normally applied to GC analysis data (such as organochlorine pesticide and PCB data). The associated data should be considered usable for decision making purposes.

JN - Indicates a tentatively identified compound (TIC) whose concentration and identification have been determined to be valid as a result of data validation. The associated data should be considered usable for decision making purposes.

UR - Indicates the constituent was analyzed for and not detected. The concentration reported has been qualified as unusable due to a major quality control deficiency identified during data validation. The associated data should be considered unusable for decision making purposes.

R - Indicates the constituent was analyzed for and detected. The concentration reported has been qualified as unusable due to a major quality control deficiency identified during data validation. The associated data should be considered unusable for decision making purposes.

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ATTACHMENT 2

SUMMARY OF DATA QUALIFICATIONS

94/3225.1595

# DATA QUALIFICATION SUMMARY

| SDG: B09332-TMA-611 | VALIDATOR: | DATE: March 3, 1994 | PAGE 1 OF 1 |
|---|---|---|---|
| COMMENTS: GENERAL GC FOR KEROSENE | | | |
| COMPOUND | QUALIFIER | SAMPLES AFFECTED | REASON |
| NO QUALIFICATIONS REQUIRED | | | |

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ATTACHMENT 3

QUALIFIED DATA SUMMARY AND ANNOTATED LABORATORY REPORTS

94/3225.1597

Validated Data Summary, Data Package: B09332-IMA-611

| | Samp# | B09332 | | B09333 | | B09336 | |
|---|---|---|---|---|---|---|---|
| | Date | 9-9-93 | | 9-10-93 | | 9-10-93 | |
| | Location | 299-W19-95 | | 299-W19-97 | | 299-W19-95 | |
| | Depth | 60.00 - 62.50 | | 50.00 - 52.50 | | 74.80 - 77.30 | |
| | Type | --- | | --- | | --- | |
| | Comments | --- | | --- | | --- | |
| Parameter | Units | Result | Q | Result | Q | Result | Q |
| KEROSENE | MG/KG | 5.000 | U | 5.000 | U | 5.000 | U |

Verified
3/03/94

TMA Inc. REPORT Work Order # A3-09-028

Received: 09/14/93

Results by Sample

SAMPLE ID B09332 FRACTION 01G TEST CODE 8015MS NAME EPA 8015M EXTRACT.

Date & Time Collected 09/09/93 Category

299-W19-95
60-62.5'

MODIFIED 8015 - EXTRACTABLE FUEL HYDROCARBONS

Matrix: SOIL
Date Analyzed: 09/24/93
Dilution factor: 1.00
Concentration Units: mg/Kg

| Compound | Sample Result | PQL |
|---|---|---|
| Kerosene Range | ND | 5 |
| C10 - C16 Jet Fuel Range | NA | NA |
| C9 - C22 Diesel Range | NA | NA |
| Hydraulic Range | NA | NA |

ND = Not detected at the specified limits

Form I

Verified
[signature] 3/23/94

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TMA Inc. REPORT Work Order # A3-09-028

Received: 09/14/93

Results by Sample

SAMPLE ID B09333 FRACTION 02G TEST CODE 8015MS NAME EPA 8015M EXTRACT.

Date & Time Collected 09/10/93 Category

299-W19-97
50-52.5'

MODIFIED 8015 - EXTRACTABLE FUEL HYDROCARBONS

Matrix: SOIL
Date Analyzed: 09/24/93
Dilution factor: 1.00
Concentration Units: mg/Kg

| Compound | Sample Result | PQL |
|---|---|---|
| Kerosene Range | ND | 5 |
| C10 - C16 Jet Fuel Range | NA | NA |
| C9 - C22 Diesel Range | NA | NA |
| Hydraulic Range | NA | NA |

ND = Not detected at the specified limits

Form I

Verified
3/03/94

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TMA Inc. REPORT Work Order # A3-09-028

Received: 09/14/93 Results by Sample

SAMPLE ID 809336 FRACTION 03D TEST CODE 8015MS NAME EPA 8015M EXTRACT.

Date & Time Collected 09/10/93 Category

299-W19-95
74.8-77.3

MODIFIED 8015 - EXTRACTABLE FUEL HYDROCARBONS

Matrix: SOIL
Date Analyzed: 09/24/93
Dilution factor: 1.00
Concentration Units: mg/Kg

| Compound | Sample Result | PQL |
|---|---|---|
| Kerosene Range | ND | 5 |
| C10 - C16 Jet Fuel Range | NA | NA |
| C9 - C22 Diesel Range | NA | NA |
| Hydraulic Range | NA | NA |

ND = Not detected at the specified limits

Form I

Verified
3/03/94

ATTACHMENT 4

LABORATORY NARRATIVE AND CHAIN-OF-CUSTODY DOCUMENTATION

9W/322F.1602

# CASE NARRATIVE

LABORATORY : TMA/ARLI

CASE : 09-028

CONTRACT ID : WESTINGHOUSE HANFORD COMPANY

SDG RECEIPT DATE : September 14, 1993

## 1.0 DESCRIPTION OF CASE :

Four soil samples were analyzed for TCL Organics- Volatiles and Semivolatiles according to the USEPA Contract Laboratory Program (CLP) Statement of Work for Organic Analysis, Revision OLM01.8. The Extractable Hydrocarbons in the Kerosene Range (K) were analyzed according to the SW-846 Method 8015M.

## 2.0 SAMPLE LIST :

| WESTINGHOUSE ID | LAB ID | ANALYSIS REQUESTED | MATRIX |
|---|---|---|---|
| B09332 | A3-09-028-01A | V | SOIL |
| B09332 MS | A3-09-028-01B | V | SOIL |
| B09332 MSD | A3-09-028-01C | V | SOIL |
| B09332 | A3-09-028-01D | SV | SOIL |
| B09332 | A3-09-028-01G | K | SOIL |
| B09333 | A3-09-028-02A | V | SOIL |
| B09333 | A3-09-028-02B | SV | SOIL |
| B09333 MS | A3-09-028-02C | SV | SOIL |
| B09333 MSD | A3-09-028-02D | SV | SOIL |
| B09333 | A3-09-028-02G | K | SOIL |
| B09336 | A3-09-028-03A | V | SOIL |
| B09336 | A3-09-028-03B | SV | SOIL |
| B09336 | A3-09-028-03D | K | SOIL |
| B09336 MS | A3-09-028-03E | K | SOIL |
| B09336 MSD | A3-09-028-03F | K | SOIL |
| B09335 | A3-09-028-04A | V | SOIL |

## 3.0 COMMENTS :

### 3.1 SHIPPING AND DOCUMENTATION :

All of the samples were received intact and properly documented.

### 3.2 ANALYSIS

#### 3.2.1 VOLATILE ANALYSIS COMMENTS :

LOW LEVEL SOIL :

The samples were analyzed by heated purge within the CLP SOW holding times.

All of the QC results were within the limits specified by the EPA CLP SOW.

TUNES :

All BFB tunes were injected directly into the GC/MS instrument.

3.2.2 SEMIVOLATILE ANALYSIS COMMENTS :

LOW LEVEL SOIL :

The samples were extracted and analyzed within the CLP SOW holding times. Phenol was detected in sample B09336 at a concentration that was below the CRQL.

The matrix spike recovery of 2,4-Dinitrotoluene in sample B09333MS was slightly above the QC limits. In accordance with the protocol, no further action was required.

All of the other QC results were within the limits specified by the EPA CLP SOW.

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3.2.3 EXTRACTABLE HYDROCARBONS "KEROSENE RANGE" COMMENTS :

SEQUENCE NOTES :

The sequence was started on 09/16/93 and was analyzed according to the SW-846 Method 8015M. The initial calibration consisted of 5 different levels of the Kerosene standard that ranged from 200ppm to 2000ppm. The continuing calibration at the 1000ppm level was injected amongst a series of samples, in order to verify the instrument stability. The %RSD in the initial calibration and the %D in the continuing calibration were below their 20% and 15% limits, respectively.

SAMPLE NOTES :

LOW LEVEL SOIL :

The samples were extracted and analyzed for extractable hydrocarbons in the Kerosene range within the required holding times. Approximately 20 g of each sample was extracted and concentrated to 5 mL.

There were no hydrocarbons detected in any of the samples. Sample B09336 was spiked with Kerosene and the matrix spike recoveries were 85% and 93%. A blank spike was prepared at the same time, and had an 79% recovery.

All of the QC results were within the limits specified by the SW-846 Method 8015M.

We certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data in this hardcopy data package and in the computer-readable data submitted on diskette is authorized by the Laboratory Manager or his designee, as verified by the following signatures.

Nicole Roth 11/29/93
Nicole Roth
CLP Program Manager

Maureen Parrish 11/29/93
Maureen Parrish
Project Manager

9411225.605

~~0000012A~~

| Westinghouse Hanford Company | CHAIN OF CUSTODY |
|---|---|

Custody Form Initiator: L E ROGERS

Company Contact: L E ROGERS — Telephone: 376-7690

Project Designation/Sampling Locations: 200-UP-2 — Collection Date: 9-9-93

Ice Chest No.: SML 366 — Field Logbook No.: EFL-1091

Bill of Lading/Airbill No.: — Offsite Property No.:

Method of Shipment: OVERNIGHT AIR SERVICE

Shipped to: TMA

Possible Sample Hazards/Remarks: Keep samples at 4C (SOIL) NONE DETECTABLE

**Sample Identification**

1) B09332

1,250ml P:CLP;TAL Metals,Hg,Ti
~~1,250ml~~ 1,20ml Gs:VOA CLP
1,250ml aG:Semi-VOA CLP
1,125ml G:Anions F,Cl,SO4 (EPA 300.0)
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,125ml G:Cynnide CLP
1,125ml Gw:Kerosene (8015M)
1,1000ml P/G:Gross alpha/beta (EP-10), Gamma Spec to include,Cs-134,Cs-137,Co-60,Eu-152, Eu-154,Eu-155,K-40,Ru-106,Na-22 (RC-30), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5) Np-237,(RC-101A, RC-622, EP-5) Pu-238,Pu-239/240 (EP-80, EP-81, EP-5) I-129 (RC-25, RC-605) Sr-90 (RC-306, RC-303, RC-309, RC-304) Tc-99 (RC-24, RC-604) Am-241,Cm-244 (EP-80, EP-90, EP-91, EP-92, EP-93, EP-5) Se-79

~~B09334~~ B09335 9-10-93

~~1,250ml P:CLP;TAL Metals,Hg,Ti~~
~~1,250ml~~ 1,20ml Gs:VOA CLP
~~1,250ml aG:Semi-VOA CLP~~
~~1,125ml G:Anions F,Cl,SO4 (EPA 300.0)~~
~~1,125ml P/G:Anions NO2,NO3 (EPA 353.2)~~
~~1,125ml G:Cyanide CLP~~
~~1,125ml Gw:Kerosene (8015M)~~
~~1,1000ml P/G:Gross alpha/beta (EP-10), Gamma Spec to include,Cs-134,Cs-137,Co-60,Eu-152, Eu-154,Eu-155,K-40,Ru-106,Na-22 (RC-30), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5) Np-237,(RC-101A, RC-622, EP-5) Pu-238,Pu-239/240 (EP-80, EP-81, EP-5) I-129 (RC-25, RC-605) Sr-90 (RC-306, RC-303, RC-309, RC-304) Tc-99 (RC-24, RC-604) Am-241,Cm-244 (EP-80, EP-90, EP-91, EP-92, EP-93, EP-5) Se-79~~

3)

1,250ml P:CLP;TAL Metals,Hg,Ti
~~1,250ml Gs:VOA CLP~~
1,250ml aG:Semi-VOA CLP
1,125ml G:Anions F,Cl,SO4 (EPA 300.0)
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,125ml G:Cynnide CLP
1,125ml Gw:Kerosene (8015M)
1,1000ml P/G:Gross alpha/beta (EP-10), Gamma Spec to include,Cs-134,Cs-137,Co-60,Eu-152, Eu-154,Eu-155,K-40,Ru-106,Na-22 (RC-30), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5) Np-237,(RC-101A, RC-622, EP-5) Pu-238,Pu-239/240 (EP-80, EP-81, EP-5) I-129 (RC-25, RC-605) Sr-90 (RC-306, RC-303, RC-309, RC-304) Tc-99 (RC-24, RC-604) Am-241,Cm-244 (EP-80, EP-90, EP-91, EP-92, EP-93, EP-5) Se-79

[] Field Transfer of Custody — Chain of Possession — (Sign and Print Names)

| Relinquished by: | Received by: | Date/Time: |
|---|---|---|
| 1040 Dave E. Roos 9-10-93 | Roy T. Sichle | 1040 9-10-93 |
| Roy T. Sichle 1054 9-10-93 | H. Narciso | 9-14-93 10:50 |
| | | |
| | | |

**Final Sample Disposition**

| Disposal Method: | Disposed by: | Date/Time: |
|---|---|---|
| | | |

Comments:

A-6000-407 (12/90) (EF) WEF061
Chain of Custody

ORIGINAL

Westinghouse Hanford Company

# CHAIN OF CUSTODY

Custody Form Initiator: L E ROGERS

Company Contact: L E ROGERS

Telephone: 376-7690

Project Designation/Sampling Locations: 200-UP-2

Collection Date: 9-10-93

Ice Chest No.: SML 366

Field Logbook No.: EFL-1091

Bill of Lading/Airbill No.:

Offsite Property No.:

Method of Shipment: OVERNIGHT AIR SERVICE

Shipped to: TMA

Possible Sample Hazards/Remarks: Keep samples at 4C (SOIL) NONE DETECTED

**Sample Identification**

1) B09333

- 1,250ml P:CLP;TAL Metals,Hg,Ti
- 1,250ml Gs:VOA CLP
- 1,250ml aG:Semi-VOA CLP
- 1,125ml G:Anions F,Cl,SO4 (EPA 300.0)
- 1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
- 1,125ml G:Cyanide CLP
- 1,125ml Gw:Kerosene (8015M)
- 1,1000ml P/G:Gross alpha/beta (EP-10), Gamma Spec to include,Cs-134,Cs-137,Co-60,Eu-152, Eu-154,Eu-155,K-40,Ru-106,Na-22 (RC-30), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5) Np-237,(RC-101A, RC-622, EP-5) Pu-238,Pu-239/240 (EP-80, EP-81, EP-5) I-129 (RC-25, RC-605) Sr-90 (RC-306, RC-303, RC-309, RC-304) Tc-99 (RC-24, RC-604) Am-241,Cm-244 (EP-80, EP-90, EP-91, EP-92, EP-93, EP-5) Se-79

B09336

- 1,250ml P:CLP;TAL Metals,Hg,Ti
- ~~1,250ml~~ Gs:VOA CLP
- 1,250ml aG:Semi-VOA CLP
- 1,125ml G:Anions F,Cl,SO4 (EPA 300.0)
- 1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
- 1,125ml G:Cyanide CLP
- 1,125ml Gw:Kerosene (8015M)
- 1,1000ml P/G:Gross alpha/beta (EP-10), Gamma Spec to include,Cs-134,Cs-137,Co-60,Eu-152, Eu-154,Eu-155,K-40,Ru-106,Na-22 (RC-30), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5) Np-237,(RC-101A, RC-622, EP-5) Pu-238,Pu-239/240 (EP-80, EP-81, EP-5) I-129 (RC-25, RC-605) Sr-90 (RC-306, RC-303, RC-309, RC-304) Tc-99 (RC-24, RC-604) Am-241,Cm-244 (EP-80, EP-90, EP-91, EP-92, EP-93, EP-5) Se-79

9-10-93

3)

- 1,250ml P:CLP;TAL Metals,Hg,Ti
- 1,250ml Gs:VOA CLP
- 1,250ml aG:Semi-VOA CLP
- 1,125ml G:Anions F,Cl,SO4 (EPA 300.0)
- 1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
- 1,125ml G:Cyanide CLP
- 1,125ml Gw:Kerosene (8015M)
- 1,1000ml P/G:Gross alpha/beta (EP-10), Gamma Spec to include,Cs-134,Cs-137,Co-60,Eu-152, Eu-154,Eu-155,K-40,Ru-106,Na-22 (RC-30), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5) Np-237,(RC-101A, RC-622, EP-5) Pu-238,Pu-239/240 (EP-80, EP-81, EP-5) I-129 (RC-25, RC-605) Sr-90 (RC-306, RC-303, RC-309, RC-304) Tc-99 (RC-24, RC-604) Am-241,Cm-244 (EP-80, EP-90, EP-91, EP-92, EP-93, EP-5) Se-79

ER 9-10-93

[] Field Transfer of Custody — Chain of Possession (Sign and Print Names)

| Relinquished by: | Received by: | Date/Time: |
|---|---|---|
| 1040 9-10-93 | R. J. Schulte | 9-10-93 1040 |
| Relinquished by: R. J. Schulte 1054 9-10-93 | Received by: A. Yaacus | Date/Time: 9-10-93 10:50 |
| Relinquished by: | Received by: | Date/Time: |
| Relinquished by: | Received by: | Date/Time: |

**Final Sample Disposition**

| Disposal Method: | Disposed by: | Date/Time: |
|---|---|---|

Comments:

A-6000-407 (12/90) (EF) WEF061
Chain of Custody

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ATTACHMENT 5

DATA VALIDATION SUPPORTING DOCUMENTATION

9417225.1608

# GENERAL GC DATA VALIDATION CHECKLIST

| VALIDATION LEVEL: | A | B | C | D | E |
|---|---|---|---|---|---|

| | | |
|---|---|---|
| PROJECT: 200-UP-2 | DATA PACKAGE: B-9332-TMA-611 | |
| VALIDATOR: [illegible] | LAB: TMA | DATE: 03/03/94 |
| CASE: | SDG: B-9332-TMA-611 | |

ANALYSES PERFORMED

| | | | | | |
|---|---|---|---|---|---|
| ☐ 8010 | ☒ 8015 (Mod) | ☐ 8020 | ☐ 8021 | 8140 | 8141 |
| ☐ 8150 | ☐ 8151 | ☐ WTPH-HCID | ☐ WTPH-G | ☐ WTPH-D | ☐ |
| ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

SAMPLES/MATRIX: Soils

B-9332
B-9333
B-9336

9413225.1609

## 1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

Is technical verification documentation present? . . . . . (Yes) No N/A

Is a case narrative present? . . . . . (Yes) No N/A

Comments:

## 2. HOLDING TIMES

Are sample holding times acceptable? . . . . . (Yes) No N/A

Comments:

GENERAL GC DATA VALIDATION CHECKLIST

## 3. INSTRUMENT CALIBRATION

### 3.1 INITIAL CALIBRATION

Was an initial calibration performed? . . . . . Yes No N/A

Are %RSD values for calibration or response factors acceptable? . . . . . Yes No N/A

Comments: _____

### 3.2 CONTINUING CALIBRATION

Was a continuing calibration check performed? . . . . . Yes No N/A

Are %D values for calibration or response factors acceptable? . Yes No N/A

Comments: _____

## 4. BLANKS

Were laboratory blanks analyzed? . . . . . Yes No N/A

Are laboratory blank results acceptable? . . . . . Yes No N/A

Were field/trip blanks analyzed? . . . . . Yes No N/A

Are field/trip blank results acceptable? . . . . . Yes No N/A

Comments: _____

## 5. ACCURACY

Were surrogates analyzed? . . . . . Yes No N/A

Are surrogate recoveries acceptable? . . . . . Yes No N/A

Were MS/MSD samples analyzed? . . . . . Yes No N/A

Are MS/MSD recoveries acceptable? . . . . . Yes No N/A

Were LCS samples analyzed? . . . . . Yes No N/A

Are LCS recoveries acceptable? . . . . . Yes No N/A

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GENERAL GC DATA VALIDATION CHECKLIST

Comments: Control limits for the MS/MSD analysis have been requested and were not available at the time of validation. No qualification of the data was required. MS%R = 85% and MSD%R = 93%.

**6. PRECISION**

Are MS/MSD sample RPD values acceptable? . . . . . Yes No N/A

Are field duplicate RPD values acceptable? . . . . . Yes No N/A

Are field split RPD values acceptable? . . . . . Yes No N/A

Comments:

**7. COMPOUND IDENTIFICATION AND QUANTITATION**

Is compound identification acceptable? . . . . . Yes No N/A

Is compound quantitation acceptable? . . . . . Yes No N/A

Comments:

**8. REPORTED RESULTS AND DETECTION LIMITS**

Are results reported for all requested analyses? . . . . . Yes No N/A

Are all results supported in the raw data? . . . . . Yes No N/A

Do results meet the CRQLs? . . . . . Yes No N/A

Comments:

9413225.1611

# HOLDING TIME SUMMARY

B0933J-TMA-611

| SDG: | VALIDATOR: | DATE: 3/3/94 | PAGE 1 OF 1 |
|---|---|---|---|
| COMMENTS: General GC. See Fentrene (Method 8015 Mod. Sig) | | | |

| FIELD SAMPLE ID | ANALYSIS TYPE | DATE SAMPLED | DATE PREPARED | DATE ANALYZED | PREP. HOLDING TIME, DAYS | ANALYSIS HOLDING TIME, DAYS | QUALIFIER |
|---|---|---|---|---|---|---|---|
| B0933J | BOSMA | 09/09/93 | 9/20/93 | 9/24/93 | 11 | 4 | None |
| B0933J | ↓ | 09/09/93 | ↓ | ↓ | 10 | 4 | ↓ |
| B0933b | ↓ | 09/10/93 | ↓ | ↓ | 10 | 4 | ↓ |
| | | (MD) 3/5/94 | | | | | |

METALS DATA VALIDATION SUMMARY FOR DATA PACKAGE:
B09332-TMA-611 (923-E418, Filename B09332.MET)

9453225.1613

MEMORANDUM

MAR 1994
RECEIVED
TQO

TO: 200-UP-2 Project QA Record March 2, 1994

FR: Susan Winter, Golder Associates Inc.

RE: METALS DATA VALIDATION SUMMARY FOR DATA PACKAGE: B09332-TMA-611 (923-E418, Filename B09332.MET)

## INTRODUCTION

This memo presents the results of data validation on data package B09332-TMA-611 prepared by the Thermo Analytical (TMA) laboratory. A list of samples validated along with the analyses reported and the method of analysis is provided in the following table.

| SAMPLE ID | SAMPLE DATE | MEDIA | ANALYSIS |
|---|---|---|---|
| B09332<br>B09333<br>B09336 | 09/09/93<br>09/10/93<br>09/10/93 | SOIL<br>SOIL<br>SOIL | SEE NOTE 1 |
| Note 1. All samples were analyzed for CLP TAL metals, titanium and cyanide. | | | |

Data validation was conducted in accordance with the WHC statement of work (WHC 1993a) and validation procedures (WHC 1993b). Attachments 1 through 5 provide the following information as indicated below:

Attachment 1. Glossary of Data Reporting Qualifiers
Attachment 2. Summary of Data Qualifications
Attachment 3. Qualified Data Summary and Annotated Laboratory Reports
Attachment 4. Laboratory Narrative and Chain-of-Custody Documentation
Attachment 5. Data Validation Supporting Documentation

RECEIVED
MAR 7 1994
VALIDATION DOCUMENT
SCLA

## DATA QUALITY OBJECTIVES

**Precision.** Goals for precision were met with the exception of the deficiencies identified below.

**Accuracy.** Goals for accuracy were met with the exception of the deficiencies identified below.

**Sample Result Verification.** All sample results were supported in the raw data.

**Detection Limits.** Detection limit goals were met for all sample results as specified in the reference analytical method.

**Completeness.** The data package was complete for all requested analyses. A total of three samples were validated in this data package with a total of 75 determinations reported, all of which were deemed valid. This results in a completeness of 100 percent, which meets normal work plan objectives of 90%.

9413225.1614

## MAJOR DEFICIENCIES

No major deficiencies were identified during data validation which required qualification of data as unusable.

## MINOR DEFICIENCIES

The following minor deficiencies were identified during data validation which required qualification of data as estimated.

### Laboratory Blanks

- Beryllium, copper and antimony were detected in the laboratory blanks at concentrations greater than the IDL but less than the CRDL. Attachments 2 and 5 provide a summary of the samples affected, data qualification applied and supporting documentation.

### Matrix Spike

- The matrix spike percent recovery (MS %R) for antimony and manganese were unacceptable. Attachments 2 and 5 provide a summary of the samples affected, data qualifications applied and supporting documentation.

### Laboratory Duplicate

- The laboratory duplicate relative percent difference (RPD) for barium and manganese were unacceptable. Attachments 2 and 5 provide a summary of the samples affected, data qualifications applied and supporting documentation.

## REFERENCES

WHC 1993a, Validation of 200-UP-2 Data, Statement of Work, Analytical Laboratory Data Validation, Task Order S-94-18, December 14, 1993, Purchase Order M073750. Westinghouse Hanford Company, Richland, Washington.

WHC 1993b, Data Validation Procedures for Chemical Analyses, WHC-SD-EN-SPP-002, Rev. 2, 1993. Westinghouse Hanford Company, Richland, Washington.

ATTACHMENT 1

GLOSSARY OF DATA REPORTING QUALIFIERS

9107327.1616

# GLOSSARY OF INORGANIC DATA REPORTING QUALIFIERS

B - Indicates the constituent was analyzed for and detected. The concentration reported is less than the contract required detection limit (CRDL) but greater than the instrument detection limit (IDL). The associated data should be considered usable for decision making purposes.

U - Indicates the constituent was analyzed for and not detected. The concentration reported is the sample detection limit corrected for aliquot size, dilution and percent solids (in the case of solid matrices) by the laboratory. The associated data should be considered usable for decision making purposes.

UJ - Indicates the constituent was analyzed for and not detected. Due to a minor quality control deficiency identified during data validation the concentration may not accurately reflect the sample detection limit. The associated data have been qualified as estimated but should be considered usable for decision making purposes.

BJ - Indicates the constituent was analyzed for and detected at a concentration less than the contract required detection limit (CRDL) but greater than the instrument detection limit (IDL). Due to a minor quality control deficiency identified during data validation the associated data have been qualified as estimated, but should be considered usable for decision making purposes.

J - Indicates the constituent was analyzed for and detected. Due to a minor quality control deficiency identified during data validation the associated data have been qualified as estimated, but should be considered usable for decision making purposes.

UR - Indicates the constituent was analyzed for and not detected. Due to a major quality control deficiency identified during data validation, the associated data have been qualified as unusable for decision making purposes.

R - Indicates the constituent was analyzed for and detected. Due to a major quality control deficiency identified during data validation, the associated data have been qualified as unusable for decision making purposes.

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ATTACHMENT 2

SUMMARY OF DATA QUALIFICATIONS

9413225.1618

# DATA QUALIFICATION SUMMARY

| SDG: B09332-TMA-611 | VALIDATOR: | DATE: March 2, 1994 | PAGE 1 OF 1 |
|---|---|---|---|
| COMMENTS: METALS | | | |
| COMPOUND | QUALIFIER | SAMPLES AFFECTED | REASON |
| BERYLLIUM | U | B09332<br>B09333<br>B09336 | PRESENT IN PREP. BLANK |
| COPPER | U | B09332<br>B09336 | PRESENT IN ICB, CCB, AND PREP. BLANK |
| ANTIMONY | UJ | B09332<br>B09333<br>B09336 | MS SPIKE %R <75% BUT >30% |
| MANGANESE | J | B09332<br>B09333<br>B09336 | MS SPIKE %R >125% |
| BARIUM | J | B09332<br>B09333<br>B09336 | DUPLICATE SAMPLE RESULT GREATER THAN ±2xCRQL AND RESULTS <5xCRQL |
| MANGANESE | J | B09332<br>B09333<br>B09336 | LABORATORY DUPLICATE RPD OUT OF CONTROL LIMITS |

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ATTACHMENT 3

QUALIFIED DATA SUMMARY AND ANNOTATED LABORATORY REPORTS

94N322F.620

Validated Data Summary, Data Package: B09332-IMA-611

| | Samp# | B09332 | | B09333 | | B09336 | |
|---|---|---|---|---|---|---|---|
| | Date | 9-9-93 | | 9-10-93 | | 9-10-93 | |
| | Location | 299-W19-95 | | 299-W19-97 | | 299-W19-95 | |
| | Depth | 60.00 - 62.50 | | 50.00 - 52.50 | | 74.80 - 77.30 | |
| | Type | --- | | --- | | --- | |
| | Comments | --- | | --- | | --- | |
| Parameter | Units | Result | Q | Result | Q | Result | Q |
| ALUMINUM | MG/KG | 4920.000 | | 7710.000 | | 4880.000 | |
| ANTIMONY | MG/KG | 2.600 | UJ | 2.700 | UJ | 2.600 | UJ |
| ARSENIC | MG/KG | 2.700 | | 3.900 | | 3.300 | |
| BARIUM | MG/KG | 45.900 | J | 84.800 | J | 42.000 | J |
| BERYLLIUM | MG/KG | 0.330 | U | 0.380 | U | 0.210 | U |
| CADMIUM | MG/KG | 0.260 | U | 0.270 | U | 0.260 | U |
| CALCIUM | MG/KG | 7440.000 | | 9330.000 | | 7960.000 | |
| CHROMIUM | MG/KG | 10.100 | | 10.300 | | 7.200 | |
| COBALT | MG/KG | 5.700 | B | 8.900 | B | 5.700 | B |
| COPPER | MG/KG | 12.400 | U | 12.800 | | 11.100 | U |
| IRON | MG/KG | 11400.000 | | 17000.000 | | 12500.000 | |
| LEAD | MG/KG | 2.800 | | 4.800 | | 2.400 | |
| MAGNESIUM | MG/KG | 4150.000 | | 5260.000 | | 3990.000 | |
| MANGANESE | MG/KG | 186.000 | J | 341.000 | J | 184.000 | J |
| MERCURY | MG/KG | 0.050 | U | 0.050 | U | 0.050 | U |
| NICKEL | MG/KG | 9.600 | | 9.500 | | 5.800 | B |
| POTASSIUM | MG/KG | 855.000 | B | 1530.000 | | 729.000 | B |
| SELENIUM | MG/KG | 0.460 | U | 0.480 | U | 0.460 | U |
| SILVER | MG/KG | 0.800 | B | 0.540 | U | 0.520 | U |
| SODIUM | MG/KG | 179.000 | B | 146.000 | B | 172.000 | B |
| THALLIUM | MG/KG | 0.440 | U | 0.460 | U | 0.440 | U |
| VANADIUM | MG/KG | 24.500 | | 35.700 | | 26.700 | |
| ZINC | MG/KG | 26.600 | | 37.500 | | 26.100 | |
| CYANIDE | MG/KG | 0.510 | U | 0.520 | U | 0.470 | U |
| TITANIUM | MG/KG | 754.000 | | 1040.000 | | 831.000 | |

Verified

3/2/94

WESTINGHOUSE/HANFORD

1

299-W19-95
60-62.5'

SAMPLE NUMBER:

B09332

# INORGANIC ANALYSIS DATA SHEET

Lab Name: SKINNER & SHERMAN LABS. Contract: 68-D0-0108

Lab Code: SKINER Case No.: N3-09-046SAS No.: SDG No.: B09332

Matrix (soil/water): SOIL Lab Sample ID: S309104-01 S

Level (low/med): LOW Date Received: 09/15/93

% Solids: 97.9

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

| CAS No. | Analyte | Concentration | C | Q | M | |
|---|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | 4920 | | | P | |
| 7440-36-0 | Antimony | 2.6 | ~~U~~ | N | P | W |
| 7440-38-2 | Arsenic | 2.7 | | | P | |
| 7440-39-3 | Barium | 45.9 | — | * | P | J |
| 7440-41-7 | Beryllium | 0.33 | ~~B~~ | | P | U |
| 7440-43-9 | Cadmium | 0.26 | U | | P | |
| 7440-70-2 | Calcium | 7440 | | | P | |
| 7440-47-3 | Chromium | 10.1 | | | P | |
| 7440-48-4 | Cobalt | 5.7 | B | | P | |
| 7440-50-8 | Copper | 12.4 | — | | P | U |
| 7439-89-6 | Iron | 11400 | | | P | |
| 7439-92-1 | Lead | 2.3 | | | P | |
| 7439-95-4 | Magnesium | 4150 | | | P | |
| 7439-96-5 | Manganese | 136 | — | N* | P | J |
| 7439-97-6 | Mercury | 0.05 | U | | CV | |
| 7440-02-0 | Nickel | 9.5 | | | P | |
| 7440-09-7 | Potassium | 355 | B | | P | |
| 7782-49-2 | Selenium | 0.46 | U | | P | |
| 7440-22-4 | Silver | 0.80 | B | | P | |
| 7440-23-5 | Sodium | 179 | B | | P | |
| 7440-28-0 | Thallium | 0.44 | U | | P | |
| 7440-62-2 | Vanadium | 24.3 | | | P | |
| 7440-66-6 | Zinc | 26.5 | | | P | |
| | Cyanide | 0.31 | U | | CA | |
| 7440-32-6 | Titanium | 754 | | | P | |

Color Before: BROWN Clarity Before: Texture: COARSE

Color After: BROWN Clarity After: Artifacts: YES

Comments:
STONES

Verified
3/22/94

009

2

FORM I - IN ILM02.1

9413225.622

299-W19-97
50-52.5'

WESTINGHOUSE/HANFORD

1

SAMPLE NUMBER:

INORGANIC ANALYSIS DATA SHEET

B09333

Lab Name: SKINNER & SHERMAN LABS. Contract: 68-D0-0108

Lab Code: SKINER Case No.: N3-09-046SAS No.: SDG No.: B09332

Matrix (soil/water): SOIL Lab Sample ID: S309104-02 S

Level (low/med): LOW Date Received: 09/15/93

% Solids: 92.1

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

| CAS No. | Analyte | Concentration | C | Q | M | |
|---|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | 7710 | | | P | |
| 7440-36-0 | Antimony | 2.7 | ~~U~~ | N | P | |
| 7440-38-2 | Arsenic | 3.9 | | | P | |
| 7440-39-3 | Barium | 84.8 | | * | P | |
| 7440-41-7 | Beryllium | 0.38 | ~~B~~ | | P | |
| 7440-43-9 | Cadmium | 0.27 | U | | P | |
| 7440-70-2 | Calcium | 9330 | | | P | |
| 7440-47-3 | Chromium | 10.3 | | | P | |
| 7440-48-4 | Cobalt | 3.9 | B | | P | |
| 7440-50-8 | Copper | 12.8 | | | P | |
| 7439-89-6 | Iron | 17000 | | | P | |
| 7439-92-1 | Lead | 4.3 | | | P | |
| 7439-95-4 | Magnesium | 5260 | | | P | |
| 7439-96-5 | Manganese | 341 | | N* | P | |
| 7439-97-6 | Mercury | 0.35 | U | | CV | |
| 7440-02-0 | Nickel | 9.5 | | | P | |
| 7440-09-7 | Potassium | 1530 | | | P | |
| 7782-49-2 | Selenium | 0.48 | U | | P | |
| 7440-22-4 | Silver | 0.34 | U | | P | |
| 7440-23-5 | Sodium | 146 | B | | P | |
| 7440-28-0 | Thallium | 0.46 | U | | P | |
| 7440-62-2 | Vanadium | 15.7 | | | P | |
| 7440-66-6 | Zinc | 37.5 | | | P | |
| | Cyanide | 0.52 | U | | CA | |
| 7440-32-6 | Titanium | 1040 | | | P | |

Color Before: BROWN Clarity Before: Texture: COARSE

Color After: BROWN Clarity After: Artifacts: YES

Comments:
. STONES

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3/23/94

3

FORM I - IN ILM02.1

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WESTINGHOUSE/HANFORD

1

299-W19-95
74.8-77.3'

SAMPLE NUMBER:

# INORGANIC ANALYSIS DATA SHEET

B09336

Lab Name: SKINNER & SHERMAN LABS. Contract: 68-D0-0108

Lab Code: SKINER Case No.: N3-09-046SAS No.: SDG No.: B09332

Matrix (soil/water): SOIL Lab Sample ID: S309104-03 S

Level (low/med): LOW Date Received: 09/15/93

% Solids: 96.9

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

| CAS No. | Analyte | Concentration | C | Q | M | |
|---|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | 4880 | | | P | |
| 7440-36-0 | Antimony | 2.6 | ~~U~~ | N | P | |
| 7440-38-2 | Arsenic | 3.3 | | | P | |
| 7440-39-3 | Barium | 42.0 | | * | P | J |
| 7440-41-7 | Beryllium | 0.21 | ~~B~~ | | P | |
| 7440-43-9 | Cadmium | 0.26 | U | | P | |
| 7440-70-2 | Calcium | 7960 | | | P | |
| 7440-47-3 | Chromium | 7.2 | | | P | |
| 7440-48-4 | Cobalt | 5.7 | B | | P | |
| 7440-50-8 | Copper | 11.1 | | | P | |
| 7439-89-6 | Iron | 12500 | | | P | |
| 7439-92-1 | Lead | 2.4 | | | P | |
| 7439-95-4 | Magnesium | 3990 | | | P | |
| 7439-96-5 | Manganese | 184 | | N* | P | J |
| 7439-97-6 | Mercury | 0.05 | U | | CV | |
| 7440-02-0 | Nickel | 5.3 | B | | P | |
| 7440-09-7 | Potassium | 729 | B | | P | |
| 7782-49-2 | Selenium | 0.46 | U | | P | |
| 7440-22-4 | Silver | 0.52 | U | | P | |
| 7440-23-5 | Sodium | 172 | B | | P | |
| 7440-28-0 | Thallium | 0.44 | U | | P | |
| 7440-62-2 | Vanadium | 26.7 | | | P | |
| 7440-66-6 | Zinc | 26.1 | | | P | |
| | Cyanide | 0.17 | U | | CA | |
| 7440-32-6 | Titanium | 831 | | | P | |

Color Before: BROWN Clarity Before: Texture: COARSE

Color After: BROWN Clarity After: Artifacts: YES

Comments:
STONES

Verified
3/22/94

4

FORM I - IN ILM02.1

011

ATTACHMENT 4

LABORATORY NARRATIVE AND CHAIN-OF-CUSTODY DOCUMENTATION

9H/3225.1625

**TMA**
**Thermo Analytical Inc.**

Skinner & Sherman Labs., Inc.
300 Second Avenue
Post Office Box 521
Waltham, MA 02254-0521
(617) 890-7200
FAX (617) 890-3883

DEC 1993
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SDLA

RECORD COPY

October 21, 1993

TMA/NORCAL
2030 Wright Avenue
Richmond, CA 94804
Attention: Dan Stuermer

9413225.1626

## Quality Control Narrative

**Scope**
Three (3) soil samples were submitted to TMA/Skinner & Sherman Laboratories, Inc. on September 15, 1993 from TMA/Norcal. The samples were analyzed for the USEPA CLP Target Analyte List metals, titanium, and cyanide. The analyses were performed under TMA/Skinner and Sherman work order S309104.

**Methodology**
The samples were prepared, analyzed and reported in accordance with the USEPA Contract Laboratory Program Statement of Work ILM02.

**Discussion**
All quality control requirements were met for the samples with the following exceptions;

The digestion spike recovery for antimony and manganese exceeded control limit requirements.

The laboratory duplicate for barium and manganese exceeded control limit requirements.

Please feel free to call if there are any questions concerning this package.

Respectfully submitted,

TMA/SKINNER & SHERMAN LABORATORIES, INC.

Steven Provencal

Steven R. Provencal
Lead Chemist

Westinghouse Hanford Company

# CHAIN OF CUSTODY

Custody Form Initiator: L E ROGERS

Company Contact: L E ROGERS

Telephone: 376-7690

Project Designation/Sampling Locations: 200-UP-2

Collection Date: 9-9-93

Ice Chest No.: SML 366

Field Logbook No.: EFL-1091

Bill of Lading/Airbill No.:

Offsite Property No.:

Method of Shipment: OVERNIGHT AIR SERVICE

Shipped to: TMA

Possible Sample Hazards/Remarks: Keep samples at 4C (SOIL) NONE DETECTABLE

Sample Identification

1) B09332

1,250ml P:CLP;TAL Metals,Hg,Ti
~~1,250ml~~ 1,120ml Gs:VOA CLP
1,250ml aG:Semi-VOA CLP
1,125ml G:Anions F,Cl,SO4 (EPA 300.0)
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,125ml G:Cyanide CLP
1,125ml Gw:Kerosene (8015M)
1,1000ml P/G:Gross alpha/beta (EP-10), Gamma Spec to include,Cs-134,Cs-137,Co-60,Eu-152, Eu-154,Eu-155,K-40,Ru-106,Na-22 (RC-30), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5) Np-237,(RC-101A, RC-622, EP-5) Pu-238,Pu-239/240 (EP-80, EP-81, EP-5) I-129 (RC-25, RC-605) Sr-90 (RC-306, RC-303, RC-309, RC-304) Tc-99 (RC-24, RC-604) Am-241,Cm-244 (EP-80, EP-90, EP-91, EP-92, EP-93, EP-5) Se-79

9-10-93

2) ~~B09334~~ B09335

~~1,250ml P:CLP;TAL Metals,Hg,Ti~~
~~1,250ml~~ 1,120ml Gs:VOA CLP
~~1,250ml aG:Semi-VOA CLP~~
~~1,125ml G:Anions F,Cl,SO4 (EPA 300.0)~~
~~1,125ml P/G:Anions NO2,NO3 (EPA 353.2)~~
~~1,125ml G:Cyanide CLP~~
~~1,125ml Gw:Kerosene (8015M)~~
~~1,1000ml P/G:Gross alpha/beta (EP-10), Gamma Spec to include,Cs-134,Cs-137,Co-60,Eu-152, Eu-154,Eu-155,K-40,Ru-106,Na-22 (RC-30), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5) Np-237,(RC-101A, RC-622, EP-5) Pu-238,Pu-239/240 (EP-80, EP-81, EP-5) I-129 (RC-25, RC-605) Sr-90 (RC-306, RC-303, RC-309, RC-304) Tc-99 (RC-24, RC-604) Am-241,Cm-244 (EP-80, EP-90, EP-91, EP-92, EP-93, EP-5) Se-79~~

9-10-93

3)

1,250ml P:CLP;TAL Metals,Hg,Ti
~~1,250ml Gs:VOA CLP~~
1,250ml aG:Semi-VOA CLP
1,125ml G:Anions F,Cl,SO4 (EPA 300.0)
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,125ml G:Cyanide CLP
1,125ml Gw:Kerosene (8015M)
1,1000ml P/G:Gross alpha/beta (EP-10), Gamma Spec to include,Cs-134,Cs-137,Co-60,Eu-152, Eu-154,Eu-155,K-40,Ru-106,Na-22 (RC-30), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5) Np-237,(RC-101A, RC-622, EP-5) Pu-238,Pu-239/240 (EP-80, EP-81, EP-5) I-129 (RC-25, RC-605) Sr-90 (RC-306, RC-303, RC-309, RC-304) Tc-99 (RC-24, RC-604) Am-241,Cm-244 (EP-80, EP-90, EP-91, EP-92, EP-93, EP-5) Se-79

[] Field Transfer of Custody — Chain of Possession — (Sign and Print Names)

| Relinquished by: | Received by: | Date/Time: |
|---|---|---|
| 1040 Eden E. Rogers 9-10-93 | Rob T. Sichle | 1040 9-10-93 |
| Rob T. Sichle 1054 9-10-93 | H. Narciso | 9-14-93 10:50 |
| | | |
| | | |

Final Sample Disposition

| Disposal Method: | Disposed by: | Date/Time: |
|---|---|---|
| | | |

Comments:

A-6000-407 (12/90) (EF) WEF061
Chain of Custody

014

Westinghouse Hanford Company

# CHAIN OF CUSTODY

Custody Form Initiator: L E ROGERS

Company Contact: L E ROGERS

Telephone: 376-7690

Project Designation/Sampling Locations: 200-UP-2

Collection Date: 9-10-93

Ice Chest No.: SML 366

Field Logbook No.: EFL-1091

Bill of Lading/Airbill No.:

Offsite Property No.:

Method of Shipment: OVERNIGHT AIR SERVICE

Shipped to: TMA

Possible Sample Hazards/Remarks: Keep samples at 4C (SOIL) NONE DETECTED

**Sample Identification**

1)

B09333

1,250ml P:CLP;TAL Metals,Hg,Ti
1,250ml Gs:VOA CLP
1,250ml aG:Semi-VOA CLP
1,125ml G:Anions F,Cl,SO4 (EPA 300.0)
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,125ml G:Cyanide CLP
1,125ml Gw:Kerosene (8015M)
1,1000ml P/G:Gross alpha/beta (EP-10), Gamma Spec to include,Cs-134,Cs-137,Co-60,Eu-152, Eu-154,Eu-155,K-40,Ru-106,Na-22 (RC-30), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5) Np-237,(RC-101A, RC-622, EP-5) Pu-238,Pu-239/240 (EP-80, EP-81, EP-5) I-129 (RC-25, RC-605) Sr-90 (RC-306, RC-303, RC-309, RC-304) Tc-99 (RC-24, RC-604) Am-241,Cm-244 (EP-80, EP-90, EP-91, EP-92, EP-93, EP-5) Se-79

B09336

1,250ml P:CLP;TAL Metals,Hg,Ti
~~1,250ml~~ Gs:VOA CLP
1,250ml aG:Semi-VOA CLP
1,125ml G:Anions F,Cl,SO4 (EPA 300.0)
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,125ml G:Cyanide CLP
1,125ml Gw:Kerosene (8015M)
1,1000ml P/G:Gross alpha/beta (EP-10), Gamma Spec to include,Cs-134,Cs-137,Co-60,Eu-152, Eu-154,Eu-155,K-40,Ru-106,Na-22 (RC-30), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5) Np-237,(RC-101A, RC-622, EP-5) Pu-238,Pu-239/240 (EP-80, EP-81, EP-5) I-129 (RC-25, RC-605) Sr-90 (RC-306, RC-303, RC-309, RC-304) Tc-99 (RC-24, RC-604) Am-241,Cm-244 (EP-80, EP-90, EP-91, EP-92, EP-93, EP-5) Se-79

100ml
9-10-93

3)

1,250ml P:CLP;TAL Metals,Hg,Ti
1,250ml Gs:VOA CLP
1,250ml aG:Semi-VOA CLP
1,125ml G:Anions F,Cl,SO4 (EPA 300.0)
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,125ml G:Cyanide CLP
1,125ml Gw:Kerosene (8015M)
1,1000ml P/G:Gross alpha/beta (EP-10), Gamma Spec to include,Cs-134,Cs-137,Co-60,Eu-152, Eu-154,Eu-155,K-40,Ru-106,Na-22 (RC-30), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5) Np-237,(RC-101A, RC-622, EP-5) Pu-238,Pu-239/240 (EP-80, EP-81, EP-5) I-129 (RC-25, RC-605) Sr-90 (RC-306, RC-303, RC-309, RC-304) Tc-99 (RC-24, RC-604) Am-241,Cm-244 (EP-80, EP-90, EP-91, EP-92, EP-93, EP-5) Se-79

ER 9-10-93

[] Field Transfer of Custody — Chain of Possession — (Sign and Print Names)

| Relinquished by: | Received by: | Date/Time: |
|---|---|---|
| 1040 9-10-93 | | 9-10-93 1040 |
| Relinquished by: Roy T Sichlle 1054 9-10-93 | Received by: A. Hacks | Date/Time: 9-14-93 10:50 |
| Relinquished by: | Received by: | Date/Time: |
| Relinquished by: | Received by: | Date/Time: |

**Final Sample Disposition**

| Disposal Method: | Disposed by: | Date/Time: |
|---|---|---|

Comments:

A-6000-407 (12/90) (EF) WEF061
Chain of Custody

015

ATTACHMENT 5

DATA VALIDATION SUPPORTING DOCUMENTATION

9413225.1629

# INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

| VALIDATION LEVEL: | A | B | C | D | E |
|---|---|---|---|---|---|

| | | |
|---|---|---|
| PROJECT: 200-UP-2 | | DATA PACKAGE: B09332-TMA-611 |
| VALIDATOR: [signature] | LAB: TMA | DATE: 03/02/94 |
| CASE: | | SDG: B09332-TMA-611 |

| ANALYSES PERFORMED | | | | | |
|---|---|---|---|---|---|
| ☒ CLP/ICP | ☐ CLP/GFAA | ☒ CLP/Hg | ☒ CLP/Cyanide | ☒ T. tanium by ICP | ☐ |
| ☐ SW-846/ICP | ☐ SW-846/GFAA | ☐ SW-846/Hg | ☐ SW-846 Cyanide | ☐ | ☐ |

| SAMPLES/MATRIX Soils |
|---|
| B09332 |
| B09333 |
| B09336 |
| |
| |

## 1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

Is technical verification documentation present? . . . . . (Yes) No N/A

Is a case narrative present? . . . . . (Yes) No N/A

Comments: _____

## 2. HOLDING TIMES

Are sample holding times acceptable? . . . . . (Yes) No N/A

Comments: _____

9413225.1630

-017

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

3. INSTRUMENT PERFORMANCE AND CALIBRATIONS

Were initial calibrations performed on all instruments? . . . . Yes No N/A
Are initial calibrations acceptable? . . . . . Yes No N/A
Are ICP interference checks acceptable? . . . . . Yes No N/A
Were ICV and CCV checks performed on all instruments? . . . . Yes No N/A
Are ICV and CCV checks acceptable? . . . . . Yes No N/A

Comments:

4. BLANKS

Were ICB and CCB checks performed for all applicable analyses? Yes No N/A
Are ICB and CCB results acceptable? . . . . . ~~Yes~~ No N/A 3/2/9
Were preparation blanks analyzed? . . . . . Yes No N/A
Are preparation blank results acceptable? . . . . . Yes No N/A
Were field/trip blanks analyzed? . . . . . Yes No N/A
Are field/trip blank results acceptable? . . . . . Yes No N/A

Comments:

~~Qualify results and report in all the.~~
See attached lab blank form for details.

5. ACCURACY

Were spike samples analyzed? . . . . . Yes No N/A
Are spike sample recoveries acceptable? . . . . . Yes No N/A
Were laboratory control samples (LCS) analyzed? . . . . . Yes No N/A
Are LCS recoveries acceptable? . . . . . Yes No N/A

Comments:

See attached lab spike form for details.

9413225.1631

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

6. PRECISION

Were laboratory duplicates analyzed? . . . . . Yes No N/A

Are laboratory duplicate samples RPD values acceptable? . . . . Yes No N/A

Were ICP serial dilution samples analyzed? . . . . . Yes No N/A

Are ICP serial dilution %D values acceptable? . . . . . Yes No N/A

Are field duplicate RPD values acceptable? . . . . . Yes No N/A

Are field split RPD values acceptable? . . . . . Yes No N/A

Comments: Qualifying results for barium & Manganese as estimated (J).

7. FURNACE AA QUALITY CONTROL

Were duplicate injections performed as required? . . . . . Yes No N/A

Are duplicate injection %RSD values acceptable? . . . . . Yes No N/A

Were analytical spikes performed as required? . . . . . Yes No N/A

Are analytical spike recoveries acceptable? . . . . . Yes No N/A

Was MSA performed as required? . . . . . Yes No N/A

Are MSA results acceptable? . . . . . Yes No N/A

Comments:

8. REPORTED RESULTS AND DETECTION LIMITS

Are results reported for all requested analyses? . . . . . Yes No N/A

Are all results supported in the raw data? . . . . . Yes No N/A

Are results calculated properly? . . . . . Yes No N/A

Do results meet the CRDLs? . . . . . Yes No N/A

Comments:

9413225.1632

# HOLDING TIME SUMMARY

B09332-TMA-611

| SDG: | VALIDATOR: | DATE: 3/2/94 | PAGE 1 OF 1 |
|---|---|---|---|
| COMMENTS: Metals | | | |

| FIELD SAMPLE ID | ANALYSIS TYPE | DATE SAMPLED | DATE PREPARED | DATE ANALYZED | PREP. HOLDING TIME, DAYS | ANALYSIS HOLDING TIME, DAYS | QUALIFIER |
|---|---|---|---|---|---|---|---|
| B09332 | ICP | 9/9/93 | 10/11/93 | 10/15/93 | | 36 | None |
| B09333 | ↓ | 9/10/93 | ↓ | ↓ | | 35 | ↓ |
| B09336 | ↓ | 9/10/93 | ↓ | ↓ | | 35 | ↓ |
| | | | | | | | |
| B09332 | As, Pb, Se, Tl | 9/9/93 | 10/11/93 | 10/12/93 | | 33 | None |
| B09333 | ↓ | 9/10/93 | ↓ | ↓ | 3/2/94 | ~~34~~ 32 | ↓ |
| B09336 | ↓ | 9/10/93 | ↓ | ↓ | 3/2/94 | ~~34~~ 32 | ↓ |
| | | | | | | | |
| B09332 | Hg | 9/9/93 | 9/30/93 | 10/04/93 | | 25 | None |
| B09333 | ↓ | 9/10/93 | ↓ | ↓ | | 24 | ↓ |
| B09336 | ↓ | ↓ | ↓ | ↓ | | 24 | ↓ |
| | | | | | | | |
| B09332 | CN | 9/9/93 | 9/20/93 | 9/21/93 | | 12 | None |
| B09333 | ↓ | 9/10/93 | ↓ | ↓ | | 11 | ↓ |
| B09336 | ↓ | ↓ | ↓ | ↓ | | 11 | ↓ |
| | | | | | | | |
| | | | | | | | |

WESTINGHOUSE/HANFORD

3
BLANKS

Lab Name: SKINNER & SHERMAN LABS. Contract: 68-D0-0108

Lab Code: SKINER Case No.: N3-09-046SAS No.: SDG No.: B09332

Preparation Blank Matrix (soil/water): SOIL

Preparation Blank Concentration Units (ug/L or mg/kg): MG/KG

| Analyte | Initial Calib. Blank (ug/L) | C | Continuing Calibration Blank (ug/L) 1 | C | 2 | C | 3 | C | Prepa-ration Blank | C | M | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Aluminum | 10.6 | U | 20.1 | B | 10.6 | U | 26.0 | B | 2.120 | U | P | |
| Antimony | 12.9 | U | 12.9 | U | -13.0 | B | 12.9 | U | 2.580 | U | P | |
| Arsenic | 1.7 | U | 1.7 | U | 1.7 | U | 1.7 | U | 0.340 | U | P | |
| Barium | 1.2 | U | 1.2 | U | 1.2 | U | 1.2 | U | 0.240 | U | P | |
| Beryllium | 0.2 | B | 0.2 | B | 0.3 | B | 0.3 | B | 0.078 | B | P | xS= 0.39 |
| Cadmium | 1.3 | U | 1.3 | U | 1.3 | U | 1.3 | U | 0.260 | U | P | |
| Calcium | 59.0 | U | 59.0 | U | 59.0 | U | 59.0 | U | 11.800 | U | P | |
| Chromium | 2.2 | B | 2.1 | U | 2.1 | U | 2.1 | U | 0.558 | B | P | |
| Cobalt | 2.6 | U | 2.6 | U | 2.6 | U | 2.6 | U | 0.520 | U | P | |
| Copper | 62.5 12.5 | B | 52 10.4 | B | 5.4 | B | 8.6 | B | 2.156 | B | P | xS=$10.78 |
| Iron | 5.3 | U | 7.4 | B | 12.5 | B | 10.6 | B | -2.758 | B | P | @3/2/94 |
| Lead | 1.1 | U | 1.1 | U | 1.1 | U | 1.1 | U | 0.220 | U | P | |
| Magnesium | 22.9 | U | 22.9 | U | 22.9 | U | 38.9 | B | 4.580 | U | P | |
| Manganese | 0.3 | U | 1.0 | B | 1.2 | B | 1.2 | B | 0.160 | U | P | |
| Mercury | 0.1 | U | 0.1 | U | 0.1 | U | 0.1 | U | 0.050 | U | CV | |
| Nickel | 3.4 | U | 3.4 | U | 3.4 | U | 3.4 | U | 0.680 | U | P | |
| Potassium | 68.5 | U | 68.5 | U | 68.5 | U | 68.5 | U | 13.700 | U | P | |
| Selenium | 2.3 | U | 2.3 | U | 2.3 | U | 2.3 | U | 0.460 | U | P | |
| Silver | 2.6 | U | 2.6 | U | 2.6 | U | 2.6 | U | 0.520 | U | P | |
| Sodium | 114.4 | U | 114.4 | U | 114.4 | U | 114.4 | U | 22.880 | U | P | |
| Thallium | 2.2 | U | 2.2 | U | 2.3 | B | 2.2 | U | 0.440 | U | P | |
| Vanadium | 5.5 | U | 5.5 | U | 5.5 | U | 5.5 | U | 1.100 | U | P | |
| Zinc | 6.0 | B | 4.4 | U | 4.9 | B | 4.4 | U | 0.380 | U | P | |
| Cyanide | 10.0 | U | 10.0 | U | 10.0 | U | 10.0 | U | 0.500 | U | CA | |
| Titanium | 1.1 | U | 1.2 | B | 1.1 | U | 1.6 | B | 0.220 | U | P | |

Assoc w/
B09332
B09333
B09336

3/2/94

WESTINGHOUSE/HANFORD

5A

SPIKE SAMPLE RECOVERY

SAMPLE NUMBER: B09336S

Lab Name: SKINNER & SHERMAN LABS. Contract: 68-D0-0108

Lab Code: SKINER Case No.: N3-09-046SAS No.: SDG No.: B09332

Matrix (soil/water): SOIL Level (low/med): LOW

% Solids for Sample: 96.9

Concentration Units (ug/L or mg/kg dry weight): MG/KG

| Analyte | Control Limit %R | Spiked Sample Result (SSR) | C | Sample Result (SR) | C | Spike Added (SA) | %R | Q | M |
|---|---|---|---|---|---|---|---|---|---|
| Aluminum | | | | | | | | | NR |
| Antimony | 75-125 | 72.0992 | | 2.5850 | U | 97.36 | 74.1 | N | P |
| Arsenic | 75-125 | 371.4781 | | 3.3010 | | 389.43 | 94.5 | | P |
| Barium | 75-125 | 413.5950 | | 42.0331 | | 389.43 | 95.4 | | P |
| Beryllium | 75-125 | 9.0406 | | 0.2124 | B | 9.74 | 90.6 | | P |
| Cadmium | 75-125 | 8.0495 | | 0.2605 | U | 9.74 | 82.6 | | P |
| Calcium | | | | | | | | | NR |
| Chromium | 75-125 | 42.0196 | | 7.1558 | | 38.94 | 89.5 | | P |
| Cobalt | 75-125 | 92.4859 | | 5.7371 | B | 97.36 | 89.1 | | P |
| Copper | 75-125 | 54.0141 | | 11.1235 | | 48.68 | 88.1 | | P |
| Iron | | | | | | | | | NR |
| Lead | 75-125 | 93.1752 | | 2.4345 | | 97.36 | 93.2 | | P |
| Magnesium | | | | | | | | | NR |
| Manganese | 75-125 | 771.3651 | | 183.7226 | | 97.36 | 603.6 | N | P |
| Mercury | 75-125 | 0.5434 | | 0.0469 | U | 0.49 | 110.9 | | CV |
| Nickel | 75-125 | 94.3690 | | 5.3232 | B | 97.36 | 90.6 | | P |
| Potassium | | | | | | | | | NR |
| Selenium | 75-125 | 364.5852 | | 0.4609 | U | 389.43 | 93.6 | | P |
| Silver | 75-125 | 9.5800 | | 0.5210 | U | 9.74 | 98.4 | | P |
| Sodium | | | | | | | | | NR |
| Thallium | 75-125 | 359.0747 | | 0.4409 | U | 389.43 | 92.2 | | P |
| Vanadium | 75-125 | 110.5380 | | 26.7356 | | 97.36 | 86.1 | | P |
| Zinc | 75-125 | 110.6431 | | 26.1124 | | 97.36 | 86.8 | | P |
| Cyanide | 75-125 | 25.6329 | | 0.4734 | U | 25.29 | 101.4 | | CA |
| Titanium | | 784.3332 | | 830.5830 | | 97.36 | -47.5 | | P |

Comments:
- No qualifier is necessary for titanium since the sample result is greater than 4x spiked amount.
- ~~Qualify all antimony results as estimated (J/UJ).~~
- ~~Qualify all manganese positive sample results as estimated (J).~~

J

J

15

FORM V (Part 1) - IN

3/02/94

ILM02.1

022

9413225.1635

WESTINGHOUSE/HANFORD

6

DUPLICATES

SAMPLE NUMBER:

B09336D

Lab Name: SKINNER & SHERMAN LABS. Contract: 68-D0-0108

Lab Code: SKINER Case No.: N3-09-046SAS No.: SDG No.: B09332

Matrix (soil/water): SOIL Level (low/med): LOW

% Solids for Sample: 96.9 % Solids for Duplicate: 97.0

Concentration Units (ug/L or mg/kg dry weight): MG/KG

| Analyte | Control Limit | Sample (S) | C | Duplicate (D) | C | RPD | Q | M |
|---|---|---|---|---|---|---|---|---|
| Aluminum | | 4878.4153 | | 5046.7402 | | 3.4 | | P |
| Antimony | | 2.5850 | U | 2.5850 | U | | | P |
| Arsenic | 2.0 | 3.3010 | | 2.7395 | | 18.6 | | P |
| Barium | 40.1 | 42.0331 | | 153.9812 | | 114.2 | * | P |
| Beryllium | | 0.2124 | B | 0.2425 | B | 13.2 | | P |
| Cadmium | | 0.2605 | U | 0.2605 | U | | | P |
| Calcium | | 7963.3693 | | 7499.6744 | | 6.0 | | P |
| Chromium | 2.0 | 7.1558 | | 8.8511 | | 21.2 | | P |
| Cobalt | | 5.7371 | B | 7.2680 | B | 23.5 | | P |
| Copper | 5.0 | 11.1235 | | 12.5843 | | 12.3 | | P |
| Iron | | 12478.8842 | | 12188.7242 | | 2.4 | | P |
| Lead | 0.6 | 2.4345 | | 2.6072 | | 6.9 | | P |
| Magnesium | 1001.9 | 3988.6982 | | 4372.2384 | | 9.2 | | P |
| Manganese | | 183.7226 | | 555.3127 | | 100.6 | * | P |
| Mercury | | 0.0469 | U | 0.0491 | U | | | CV |
| Nickel | 3.0 | 5.3232 | B | 3.2960 | | 35.0 | | P |
| Potassium | | 728.8467 | B | 796.4572 | B | 8.9 | | P |
| Selenium | | 0.4609 | U | 0.4712 | B | 200.0 | | P |
| Silver | | 0.5210 | U | 0.5210 | U | | | P |
| Sodium | | 172.1723 | B | 210.7868 | B | 20.2 | | P |
| Thallium | | 0.4409 | U | 0.4409 | U | | | P |
| Vanadium | 10.0 | 26.7356 | | 25.3990 | | 5.1 | | P |
| Zinc | | 26.1124 | | 26.5292 | | 1.6 | | P |
| Cyanide | | 0.4734 | U | 0.5109 | U | | | CA |
| Titanium | | 830.5830 | | 681.5153 | | 19.7 | | P |

Qualify positive results for barium and manganese as estimated (J).

3/22/94

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FORM VI - IN ILM02.1

023

METALS DATA VALIDATION SUMMARY FOR DATA PACKAGE:
B09332-TMA-611 (923-E418, Filename B09332.MET)

9413225.1637

COPY

MEMORANDUM

TO: 200-UP-2 Project QA Record April 20, 1994

FR: Susan Winter, Golder Associates Inc.

RE: METALS DATA VALIDATION SUMMARY FOR DATA PACKAGE: B09332-TMA-611 (923-E418, Filename B09332.MET)

9413225.1638

## INTRODUCTION

This memo presents the results of data validation on data package B09332-TMA-611 prepared by the Thermo Analytical (TMA) laboratory. A list of samples validated along with the analyses reported and the method of analysis is provided in the following table.

| SAMPLE ID | SAMPLE DATE | MEDIA | ANALYSIS |
|---|---|---|---|
| B09332<br>B09333<br>B09336 | 09/09/93<br>09/10/93<br>09/10/93 | SOIL<br>SOIL<br>SOIL | SEE NOTE 1 |
| Note 1. All samples were analyzed for CLP TAL metals, titanium and cyanide. | | | |

Data validation was conducted in accordance with the WHC statement of work (WHC 1993a) and validation procedures (WHC 1993b). Attachments 1 through 5 provide the following information as indicated below:

Attachment 1. Glossary of Data Reporting Qualifiers
Attachment 2. Summary of Data Qualifications
Attachment 3. Qualified Data Summary and Annotated Laboratory Reports
Attachment 4. Laboratory Narrative and Chain-of-Custody Documentation
Attachment 5. Data Validation Supporting Documentation

## DATA QUALITY OBJECTIVES

This section presents a summary of the data quality in terms of the referenced validation criteria.

**Precision.** Goals for precision were met with the exception of the deficiencies identified below.

**Accuracy.** Goals for accuracy were met with the exception of the deficiencies identified below.

**Sample Result Verification.** All sample results were supported in the raw data.

**Detection Limits.** Detection limit goals were met for all sample results as specified in the reference analytical method.

Revised 4/30/94



001

**Completeness.** The data package was complete for all requested analyses. A total of three samples were validated in this data package with a total of 75 determinations reported, all of which were deemed valid. This results in a completeness of 100 percent, which meets normal work plan objectives of 90%.

## MAJOR DEFICIENCIES

No major deficiencies were identified during data validation which required qualification of data as unusable.

## MINOR DEFICIENCIES

The following minor deficiencies were identified during data validation which required qualification of data as estimated.

### Laboratory Blanks

- Beryllium, copper and antimony were detected in the laboratory blanks at concentrations greater than the IDL but less than the CRDL. Attachments 2 and 5 provide a summary of the samples affected, data qualification applied and supporting documentation.

### Matrix Spike

- The matrix spike percent recovery (MS %R) for antimony and manganese were unacceptable. Attachments 2 and 5 provide a summary of the samples affected, data qualifications applied and supporting documentation.

### Laboratory Duplicate

- The laboratory duplicate relative percent difference (RPD) for barium and manganese were unacceptable. Attachments 2 and 5 provide a summary of the samples affected, data qualifications applied and supporting documentation.

## REFERENCES

WHC 1993a, Validation of 200-UP-2 Data, Statement of Work, Analytical Laboratory Data Validation, Task Order S-94-18, December 14, 1993, Purchase Order M073750. Westinghouse Hanford Company, Richland, Washington.

WHC 1993b, Data Validation Procedures for Chemical Analyses, WHC-SD-EN-SPP-002, Rev. 2, 1993. Westinghouse Hanford Company, Richland, Washington.

Revised 4/20/94

ATTACHMENT 1

GLOSSARY OF DATA REPORTING QUALIFIERS

9W3225.1640

# GLOSSARY OF INORGANIC DATA REPORTING QUALIFIERS

B - Indicates the constituent was analyzed for and detected. The concentration reported is less than the contract required detection limit (CRDL) but greater than the instrument detection limit (IDL). The associated data should be considered usable for decision making purposes.

U - Indicates the constituent was analyzed for and not detected. The concentration reported is the sample detection limit corrected for aliquot size, dilution and percent solids (in the case of solid matrices) by the laboratory. The associated data should be considered usable for decision making purposes.

UJ - Indicates the constituent was analyzed for and not detected. Due to a minor quality control deficiency identified during data validation the concentration may not accurately reflect the sample detection limit. The associated data have been qualified as estimated but should be considered usable for decision making purposes.

BJ - Indicates the constituent was analyzed for and detected at a concentration less than the contract required detection limit (CRDL) but greater than the instrument detection limit (IDL). Due to a minor quality control deficiency identified during data validation the associated data have been qualified as estimated, but should be considered usable for decision making purposes.

J - Indicates the constituent was analyzed for and detected. Due to a minor quality control deficiency identified during data validation the associated data have been qualified as estimated, but should be considered usable for decision making purposes.

UR - Indicates the constituent was analyzed for and not detected. Due to a major quality control deficiency identified during data validation, the associated data have been qualified as unusable for decision making purposes.

R - Indicates the constituent was analyzed for and detected. Due to a major quality control deficiency identified during data validation, the associated data have been qualified as unusable for decision making purposes.

9413225.1641

ATTACHMENT 2

SUMMARY OF DATA QUALIFICATIONS

9413225.1642

# DATA QUALIFICATION SUMMARY

| SDG: B09332-TMA-611 | VALIDATOR: | DATE: March 2, 1994 | PAGE 1 OF 1 |
|---|---|---|---|
| COMMENTS: METALS | | | |
| COMPOUND | QUALIFIER | SAMPLES AFFECTED | REASON |
| BERYLLIUM | U | B09332<br>B09333<br>B09336 | PRESENT IN PREP. BLANK |
| COPPER | U | B09332<br>B09336 | PRESENT IN ICB, CCB, AND PREP. BLANK |
| ANTIMONY | UJ | B09332<br>B09333<br>B09336 | MS SPIKE %R <75% BUT >30% |
| MANGANESE | J | B09332<br>B09333<br>B09336 | MS SPIKE %R >125% |
| BARIUM | J | B09332<br>B09333<br>B09336 | DUPLICATE SAMPLE RESULT GREATER THAN ±2xCRQL AND RESULTS <5xCRQL |
| MANGANESE | J | B09332<br>B09333<br>B09336 | LABORATORY DUPLICATE RPD OUT OF CONTROL LIMITS |

9413225.1643

006

ATTACHMENT 3

QUALIFIED DATA SUMMARY AND ANNOTATED LABORATORY REPORTS

91.3225.1641

9413225.1645

Validated Data Summary, Data Package: B09332-TMA-611

| | Samp# | B09332 | | B09333 | | B09336 | |
|---|---|---|---|---|---|---|---|
| | Date | 9-9-93 | | 9-10-93 | | 9-10-93 | |
| | Location | 299-W19-95 | | 299-W19-97 | | 299-W19-95 | |
| | Depth | 60.00 - 62.50 | | 50.00 - 52.50 | | 74.80 - 77.30 | |
| | Type | --- | | --- | | --- | |
| | Comments | --- | | --- | | --- | |
| Parameter | Units | Result | Q | Result | Q | Result | Q |
| ALUMINUM | MG/KG | 4920.000 | | 7710.000 | | 4880.000 | |
| ANTIMONY | MG/KG | 2.600 | UJ | 2.700 | UJ | 2.600 | UJ |
| ARSENIC | MG/KG | 2.700 | | 3.900 | | 3.300 | |
| BARIUM | MG/KG | 45.900 | J | 84.800 | J | 42.000 | J |
| BERYLLIUM | MG/KG | 0.330 | U | 0.380 | U | 0.210 | U |
| CADMIUM | MG/KG | 0.260 | U | 0.270 | U | 0.260 | U |
| CALCIUM | MG/KG | 7440.000 | | 9330.000 | | 7960.000 | |
| CHROMIUM | MG/KG | 10.100 | | 10.300 | | 7.200 | |
| COBALT | MG/KG | 5.700 | B | 8.900 | B | 5.700 | B |
| COPPER | MG/KG | 12.400 | U | 12.800 | | 11.100 | U |
| IRON | MG/KG | 11400.000 | | 17000.000 | | 12500.000 | |
| LEAD | MG/KG | 2.800 | | 4.800 | | 2.400 | |
| MAGNESIUM | MG/KG | 4150.000 | | 5260.000 | | 3990.000 | |
| MANGANESE | MG/KG | 186.000 | J | 341.000 | J | 184.000 | J |
| MERCURY | MG/KG | 0.050 | U | 0.050 | U | 0.050 | U |
| NICKEL | MG/KG | 9.600 | | 9.500 | | 5.800 | B |
| POTASSIUM | MG/KG | 855.000 | B | 1530.000 | | 729.000 | B |
| SELENIUM | MG/KG | 0.460 | U | 0.480 | U | 0.460 | U |
| SILVER | MG/KG | 0.800 | B | 0.540 | U | 0.520 | U |
| SODIUM | MG/KG | 179.000 | B | 146.000 | B | 172.000 | B |
| THALLIUM | MG/KG | 0.440 | U | 0.460 | U | 0.440 | U |
| VANADIUM | MG/KG | 24.500 | | 35.700 | | 26.700 | |
| ZINC | MG/KG | 26.600 | | 37.500 | | 26.100 | |
| CYANIDE | MG/KG | 0.510 | U | 0.520 | U | 0.470 | U |
| TITANIUM | MG/KG | 754.000 | | 1040.000 | | 831.000 | |

Verified

3/2/94

800-

WESTINGHOUSE/HANFORD

1

299-W19-95
60-62.5'

SAMPLE NUMBER:

B09332

# INORGANIC ANALYSIS DATA SHEET

Lab Name: SKINNER & SHERMAN LABS. Contract: 68-D0-0108

Lab Code: SKINER Case No.: N3-09-046SAS No.: SDG No.: B09332

Matrix (soil/water): SOIL Lab Sample ID: S309104-01 S

Level (low/med): LOW Date Received: 09/15/93

% Solids: 97.9

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

| CAS No. | Analyte | Concentration | C | Q | M | Q |
|---|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | 4920 | | | P | |
| 7440-36-0 | Antimony | 2.6 | ~~U~~ | N | P | W |
| 7440-38-2 | Arsenic | 2.7 | | | P | |
| 7440-39-3 | Barium | 45.9 | | * | P | J |
| 7440-41-7 | Beryllium | 0.33 | ~~B~~ | | P | U |
| 7440-43-9 | Cadmium | 0.26 | U | | P | |
| 7440-70-2 | Calcium | 7440 | | | P | |
| 7440-47-3 | Chromium | 10.1 | | | P | |
| 7440-48-4 | Cobalt | 5.7 | B | | P | |
| 7440-50-8 | Copper | 12.4 | | | P | U |
| 7439-89-6 | Iron | 11400 | | | P | |
| 7439-92-1 | Lead | 2.8 | | | P | |
| 7439-95-4 | Magnesium | 4150 | | | P | |
| 7439-96-5 | Manganese | 186 | | N* | P | J |
| 7439-97-6 | Mercury | 0.05 | U | | CV | |
| 7440-02-0 | Nickel | 9.6 | | | P | |
| 7440-09-7 | Potassium | 855 | B | | P | |
| 7782-49-2 | Selenium | 0.46 | U | | P | |
| 7440-22-4 | Silver | 0.80 | B | | P | |
| 7440-23-5 | Sodium | 179 | B | | P | |
| 7440-28-0 | Thallium | 0.44 | U | | P | |
| 7440-62-2 | Vanadium | 24.5 | | | P | |
| 7440-66-6 | Zinc | 26.6 | | | P | |
| | Cyanide | 0.51 | U | | CA | |
| 7440-32-6 | Titanium | 754 | | | P | |

Color Before: BROWN Clarity Before: Texture: COARSE

Color After: BROWN Clarity After: Artifacts: YES

Comments:
. STONES

Verified
3/22/94

009

FORM I - IN ILM02.1

299-W19-97
50-52.5'

WESTINGHOUSE/HANFORD

1

SAMPLE NUMBER:

INORGANIC ANALYSIS DATA SHEET

B09333

Lab Name: SKINNER & SHERMAN LABS. Contract: 68-D0-0108

Lab Code: SKINER Case No.: N3-09-046SAS No.: SDG No.: B09332

Matrix (soil/water): SOIL Lab Sample ID: S309104-02 S

Level (low/med): LOW Date Received: 09/15/93

% Solids: 92.1

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

| CAS No. | Analyte | Concentration | C | Q | M | Q |
|---|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | 7710 | | | P | |
| 7440-36-0 | Antimony | 2.7 | ~~U~~ | N | P | W |
| 7440-38-2 | Arsenic | 3.9 | | | P | |
| 7440-39-3 | Barium | 84.8 | | * | P | W |
| 7440-41-7 | Beryllium | 0.38 | ~~B~~ | | P | W |
| 7440-43-9 | Cadmium | 0.27 | U | | P | |
| 7440-70-2 | Calcium | 9330 | | | P | |
| 7440-47-3 | Chromium | 10.3 | | | P | |
| 7440-48-4 | Cobalt | 8.9 | B | | P | |
| 7440-50-8 | Copper | 12.8 | | | P | |
| 7439-89-6 | Iron | 17000 | | | P | |
| 7439-92-1 | Lead | 4.8 | | | P | |
| 7439-95-4 | Magnesium | 5260 | | | P | |
| 7439-96-5 | Manganese | 341 | | N* | P | W |
| 7439-97-6 | Mercury | 0.05 | U | | CV | |
| 7440-02-0 | Nickel | 9.5 | | | P | |
| 7440-09-7 | Potassium | 1530 | | | P | |
| 7782-49-2 | Selenium | 0.48 | U | | P | |
| 7440-22-4 | Silver | 0.54 | U | | P | |
| 7440-23-5 | Sodium | 146 | B | | P | |
| 7440-28-0 | Thallium | 0.46 | U | | P | |
| 7440-62-2 | Vanadium | 35.7 | | | P | |
| 7440-66-6 | Zinc | 37.5 | | | P | |
| | Cyanide | 0.52 | U | | CA | |
| 7440-32-6 | Titanium | 1040 | | | P | |

Color Before: BROWN Clarity Before: Texture: COARSE

Color After: BROWN Clarity After: Artifacts: YES

Comments:
. STONES

Verified
3/02/94

3

FORM I - IN ILM02.1

010

WESTINGHOUSE/HANFORD
1

299-W19-95
74.8-77.3'

SAMPLE NUMBER:

INORGANIC ANALYSIS DATA SHEET

B09336

Lab Name: SKINNER & SHERMAN LABS. Contract: 68-D0-0108

Lab Code: SKINER Case No.: N3-09-046SAS No.: SDG No.: B09332

Matrix (soil/water): SOIL Lab Sample ID: S309104-03 S

Level (low/med): LOW Date Received: 09/15/93

% Solids: 96.9

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

| CAS No. | Analyte | Concentration | C | Q | M | Q |
|---|---|---|---|---|---|---|
| 7429-90-5 | Aluminum | 4880 | | | P | |
| 7440-36-0 | Antimony | 2.6 | ~~U~~ | N | P | UJ |
| 7440-38-2 | Arsenic | 3.3 | | | P | |
| 7440-39-3 | Barium | 42.0 | | * | P | J |
| 7440-41-7 | Beryllium | 0.21 | ~~B~~ | | P | U |
| 7440-43-9 | Cadmium | 0.26 | U | | P | |
| 7440-70-2 | Calcium | 7960 | | | P | |
| 7440-47-3 | Chromium | 7.2 | | | P | |
| 7440-48-4 | Cobalt | 5.7 | B | | P | |
| 7440-50-8 | Copper | 11.1 | | | P | U |
| 7439-89-6 | Iron | 12500 | | | P | |
| 7439-92-1 | Lead | 2.4 | | | P | |
| 7439-95-4 | Magnesium | 3990 | | | P | |
| 7439-96-5 | Manganese | 184 | | N* | P | J |
| 7439-97-6 | Mercury | 0.05 | U | | CV | |
| 7440-02-0 | Nickel | 5.8 | B | | P | |
| 7440-09-7 | Potassium | 729 | B | | P | |
| 7782-49-2 | Selenium | 0.46 | U | | P | |
| 7440-22-4 | Silver | 0.52 | U | | P | |
| 7440-23-5 | Sodium | 172 | B | | P | |
| 7440-28-0 | Thallium | 0.44 | U | | P | |
| 7440-62-2 | Vanadium | 26.7 | | | P | |
| 7440-66-6 | Zinc | 26.1 | | | P | |
| | Cyanide | 0.47 | U | | CA | |
| 7440-32-6 | Titanium | 831 | | | P | |

Color Before: BROWN Clarity Before: Texture: COARSE

Color After: BROWN Clarity After: Artifacts: YES

Comments:
STONES

Verified
3/22/94

4

FORM I - IN ILM02.1

011

ATTACHMENT 4

LABORATORY NARRATIVE AND CHAIN-OF-CUSTODY DOCUMENTATION

9W3225.1649

**TMA**
**Thermo Analytical Inc.**

**Skinner & Sherman Labs., Inc.**
300 Second Avenue
Post Office Box 521
Waltham, MA 02254-0521
(617) 890-7200
FAX (617) 890-3883

DEC 1993
RECEIVED
SDLA

RECORD COPY

October 21, 1993

TMA/NORCAL
2030 Wright Avenue
Richmond, CA 94804
Attention: Dan Stuermer

PM 3225 1650

## Quality Control Narrative

**Scope**
Three (3) soil samples were submitted to TMA/Skinner & Sherman Laboratories, Inc. on September 15, 1993 from TMA/Norcal. The samples were analyzed for the USEPA CLP Target Analyte List metals, titanium, and cyanide. The analyses were performed under TMA/Skinner and Sherman work order S309104.

**Methodology**
The samples were prepared, analyzed and reported in accordance with the USEPA Contract Laboratory Program Statement of Work ILM02.

**Discussion**
All quality control requirements were met for the samples with the following exceptions;

The digestion spike recovery for antimony and manganese exceeded control limit requirements.

The laboratory duplicate for barium and manganese exceeded control limit requirements.

Please feel free to call if there are any questions concerning this package.

Respectfully submitted,

TMA/SKINNER & SHERMAN LABORATORIES, INC.

Steven Provencal

Steven R. Provencal
Lead Chemist

~~0000024~~

| Westinghouse Hanford Company | CHAIN OF CUSTODY |
|---|---|

Custody Form Initiator: L E ROGERS

Company Contact: L E ROGERS — Telephone: 376-7690

Project Designation/Sampling Locations: 200-UP-2 — Collection Date: 9-9-93

Ice Chest No.: SML 366 — Field Logbook No.: EFL-1091

Bill of Lading/Airbill No.: — Offsite Property No.:

Method of Shipment: OVERNIGHT AIR SERVICE

Shipped to: TMA

Possible Sample Hazards/Remarks: Keep samples at 4C (SOIL) NONE DETECTABLE

Sample Identification

1) B09332

1,250ml P:CLP;TAL Metals,Hg,Ti
~~1,250ml~~ Gs:VOA CLP (1,120ml)
1,250ml aG:Semi-VOA CLP
1,125ml G:Anions F,Cl,SO4 (EPA 300.0)
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,125ml G:Cynnide CLP
1,125ml Gw:Kerosene (8015M)
1,1000ml P/G:Gross alpha/beta (EP-10), Gamma Spec to include,Cs-134,Cs-137,Co-60,Eu-152, Eu-154,Eu-155,K-40,Ru-106,Na-22 (RC-30), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5) Np-237,(RC-101A, RC-622, EP-5) Pu-238,Pu-239/240 (EP-80, EP-81, EP-5) I-129 (RC-25, RC-605) Sr-90 (RC-306, RC-303, RC-309, RC-304) Tc-99 (RC-24, RC-604) Am-241,Cm-244 (EP-80, EP-90, EP-91, EP-92, EP-93, EP-5) Se-79

9-10-93

2) ~~B09334~~ B09335

~~1,250ml P:CLP;TAL Metals,Hg,Ti~~
~~1,250ml~~ Gs:VOA CLP (2,120ml)
~~1,250ml aG:Semi-VOA CLP~~
~~1,125ml G:Anions F,Cl,SO4 (EPA 300.0)~~
~~1,125ml P/G:Anions NO2,NO3 (EPA 353.2)~~
~~1,125ml G:Cynnide CLP~~
~~1,125ml Gw:Kerosene (8015M)~~
~~1,1000ml P/G:Gross alpha/beta (EP-10), Gamma Spec to include,Cs-134,Cs-137,Co-60,Eu-152, Eu-154,Eu-155,K-40,Ru-106,Na-22 (RC-30), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5) Np-237,(RC-101A, RC-622, EP-5) Pu-238,Pu-239/240 (EP-80, EP-81, EP-5) I-129 (RC-25, RC-605) Sr-90 (RC-306, RC-303, RC-309, RC-304) Tc-99 (RC-24, RC-604) Am-241,Cm-244 (EP-80, EP-90, EP-91, EP-92, EP-93, EP-5) Se-79~~

9-10-93

3)

1,250ml P:CLP;TAL Metals,Hg,Ti
~~1,250ml Gs:VOA CLP~~
1,250ml aG:Semi-VOA CLP
1,125ml G:Anions F,Cl,SO4 (EPA 300.0)
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,125ml G:Cynnide CLP
1,125ml Gw:Kerosene (8015M)
1,1000ml P/G:Gross alpha/beta (EP-10), Gamma Spec to include,Cs-134,Cs-137,Co-60,~~Eu-152~~, Eu-154,Eu-155,K-40,Ru-106,Na-22 (RC-30), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5) Np-237,(RC-101A, RC-622, EP-5) Pu-238,Pu-239/240 (EP-80, EP-81, EP-5) I-129 (RC-25, RC-605) Sr-90 (RC-306, RC-303, RC-309, RC-304) Tc-99 (RC-24, RC-604) Am-241,Cm-244 (EP-80, EP-90, EP-91, EP-92, EP-93, EP-5) Se-79

[] Field Transfer of Custody — Chain of Possession — (Sign and Print Names)

| Relinquished by: | Received by: | Date/Time: |
|---|---|---|
| 1040 Loren E. Rogers 9-10-93 | Roy T. Sickle | 1040 9-10-93 |
| Roy T. Sickle 1054 9-10-93 | H. Narciso | 9-14-93 10:50 |
| | | |
| | | |

Final Sample Disposition

| Disposal Method: | Disposed by: | Date/Time: |
|---|---|---|
| | | |

Comments:

A-6000-407 (12/90) (EF) WEF061
Chain of Custody

014

~~000002C~~

Westinghouse Hanford Company

# CHAIN OF CUSTODY

Custody Form Initiator: L E ROGERS

Company Contact: L E ROGERS

Telephone: 376-7690

Project Designation/Sampling Locations: 200-UP-2

Collection Date: 9-10-93

Ice Chest No.: SML 366

Field Logbook No.: EFL-1091

Bill of Lading/Airbill No.:

Offsite Property No.:

Method of Shipment: OVERNIGHT AIR SERVICE

Shipped to: TMA

Possible Sample Hazards/Remarks: Keep samples at 4C (SOIL) NONE DETECTED

## Sample Identification

1)

B09333

1,250ml P:CLP;TAL Metals,Hg,Ti
1,250ml Gs:VOA CLP
1,250ml aG:Semi-VOA CLP
1,125ml G:Anions F,Cl,SO4 (EPA 300.0)
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,125ml G:Cyanide CLP
1,125ml Gw:Kerosene (8015M)
1,1000ml P/G:Gross alpha/beta (EP-10), Gamma Spec to include,Cs-134,Cs-137,Co-60,Eu-152, Eu-154,Eu-155,K-40,Ru-106,Na-22 (RC-30), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5) Np-237,(RC-101A, RC-622, EP-5) Pu-238,Pu-239/240 (EP-80, EP-81, EP-5) I-129 (RC-25, RC-605) Sr-90 (RC-306, RC-303, RC-309, RC-304) Tc-99 (RC-24, RC-604) Am-241,Cm-244 (EP-80, EP-90, EP-91, EP-92, EP-93, EP-5) Se-79

B09336

1,250ml P:CLP;TAL Metals,Hg,Ti
~~1,250ml~~ Gs:VOA CLP
1,250ml aG:Semi-VOA CLP
1,125ml G:Anions F,Cl,SO4 (EPA 300.0)
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,125ml G:Cyanide CLP
1,125ml Gw:Kerosene (8015M)
1,1000ml P/G:Gross alpha/beta (EP-10), Gamma Spec to include,Cs-134,Cs-137,Co-60,Eu-152, Eu-154,Eu-155,K-40,Ru-106,Na-22 (RC-30), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5) Np-237,(RC-101A, RC-622, EP-5) Pu-238,Pu-239/240 (EP-80, EP-81, EP-5) I-129 (RC-25, RC-605) Sr-90 (RC-306, RC-303, RC-309, RC-304) Tc-99 (RC-24, RC-604) Am-241,Cm-244 (EP-80, EP-90, EP-91, EP-92, EP-93, EP-5) Se-79

1,100ml
SR
9-10-93

3)

1,250ml P:CLP;TAL Metals,Hg,Ti
1,250ml Gs:VOA CLP
1,250ml aG:Semi-VOA CLP
1,125ml G:Anions F,Cl,SO4 (EPA 300.0)
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,125ml G:Cyanide CLP
1,125ml Gw:Kerosene (8015M)
1,1000ml P/G:Gross alpha/beta (EP-10), Gamma Spec to include,Cs-134,Cs-137,Co-60,Eu-152, Eu-154,Eu-155,K-40,Ru-106,Na-22 (RC-30), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5) Np-237,(RC-101A, RC-622, EP-5) Pu-238,Pu-239/240 (EP-80, EP-81, EP-5) I-129 (RC-25, RC-605) Sr-90 (RC-306, RC-303, RC-309, RC-304) Tc-99 (RC-24, RC-604) Am-241,Cm-244 (EP-80, EP-90, EP-91, EP-92, EP-93, EP-5) Se-79

SR 9-10-93

[] Field Transfer of Custody

Chain of Possession (Sign and Print Names)

| Relinquished by: | Received by: | Date/Time: |
|---|---|---|
| 1040 Jerome E. Rogers 9-10-93 | Roy T Sichile | 9-10-93 1040 |
| Relinquished by: Roy T Sichile 1054 9-10-93 | Received by: H. Hadcock | Date/Time: 9-14-93 10:50 |
| Relinquished by: | Received by: | Date/Time: |
| Relinquished by: | Received by: | Date/Time: |

Final Sample Disposition

| Disposal Method: | Disposed by: | Date/Time: |
|---|---|---|

Comments:

A-6000-407 (12/90) (EF) WEF061
Chain of Custody

ATTACHMENT 5

DATA VALIDATION SUPPORTING DOCUMENTATION

9413225.1653

# INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

| VALIDATION LEVEL: | A | B | C | D | E |
|---|---|---|---|---|---|
| PROJECT: 200-UP-2 | | | DATA PACKAGE: B09332-TMA-611 | | |
| VALIDATOR: [illegible] | | LAB: TMA | | DATE: 03/02/94 | |
| CASE: | | | SDG: B09332-TMA-611 | | |
| ANALYSES PERFORMED | | | | | |
| ☒ CLP/ICP | ☐ CLP/GFAA | ☒ CLP/Hg | ☒ CLP/Cyanide | ☒ Titanium by ICP | ☐ |
| ☐ SW-846/ICP | ☐ SW-846/GFAA | ☐ SW-846/Hg | ☐ SW-846 Cyanide | ☐ | ☐ |
| SAMPLES/MATRIX Soils | | | | | |
| B09332 | | | | | |
| B09333 | | | | | |
| B09336 | | | | | |
| | | | | | |
| | | | | | |

9413225.1654

## 1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

Is technical verification documentation present? . . . . . (Yes) No N/A

Is a case narrative present? . . . . . (Yes) No N/A

Comments:

## 2. HOLDING TIMES

Are sample holding times acceptable? . . . . . (Yes) No N/A

Comments:

-017

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

3. INSTRUMENT PERFORMANCE AND CALIBRATIONS

Were initial calibrations performed on all instruments? . . . . Yes No N/A
Are initial calibrations acceptable? . . . . . Yes No N/A
Are ICP interference checks acceptable? . . . . . Yes No N/A
Were ICV and CCV checks performed on all instruments? . . . . . Yes No N/A
Are ICV and CCV checks acceptable? . . . . . Yes No N/A

Comments:

4. BLANKS

Were ICB and CCB checks performed for all applicable analyses? Yes No N/A
Are ICB and CCB results acceptable? . . . . . ~~Yes~~ No N/A 3/2/94
Were preparation blanks analyzed? . . . . . Yes No N/A
Are preparation blank results acceptable? . . . . . Yes No N/A
Were field/trip blanks analyzed? . . . . . Yes No N/A
Are field/trip blank results acceptable? . . . . . Yes No N/A

Comments:
~~Qualify beryllium and copper in all three.~~
See attached lab blank form for details.

5. ACCURACY

Were spike samples analyzed? . . . . . Yes No N/A
Are spike sample recoveries acceptable? . . . . . Yes No N/A
Were laboratory control samples (LCS) analyzed? . . . . . Yes No N/A
Are LCS recoveries acceptable? . . . . . Yes No N/A

Comments:
See attached lab spike form for details.

9413225.1655

INORGANIC ANALYSIS DATA VALIDATION CHECKLIST

6. PRECISION

Were laboratory duplicates analyzed? . . . . . Yes No N/A

Are laboratory duplicate samples RPD values acceptable? . . . . Yes No N/A

Were ICP serial dilution samples analyzed? . . . . . Yes No N/A

Are ICP serial dilution %D values acceptable? . . . . . Yes No N/A

Are field duplicate RPD values acceptable? . . . . . Yes No N/A

Are field split RPD values acceptable? . . . . . Yes No N/A

Comments: Qualifying results for barium & Manganese as estimated (J).

7. FURNACE AA QUALITY CONTROL

Were duplicate injections performed as required? . . . . . Yes No N/A

Are duplicate injection %RSD values acceptable? . . . . . Yes No N/A

Were analytical spikes performed as required? . . . . . Yes No N/A

Are analytical spike recoveries acceptable? . . . . . Yes No N/A

Was MSA performed as required? . . . . . Yes No N/A

Are MSA results acceptable? . . . . . Yes No N/A

Comments:

8. REPORTED RESULTS AND DETECTION LIMITS

Are results reported for all requested analyses? . . . . . Yes No N/A

Are all results supported in the raw data? . . . . . Yes No N/A

Are results calculated properly? . . . . . Yes No N/A

Do results meet the CRDLs? . . . . . Yes No N/A

Comments:

9413225.1656



019

# HOLDING TIME SUMMARY

B09332-TMA-611

| SDG: | VALIDATOR: | DATE: 3/2/94 | PAGE 1 OF 1 |
|---|---|---|---|
| COMMENTS: Metals | | | |

| FIELD SAMPLE ID | ANALYSIS TYPE | DATE SAMPLED | DATE PREPARED | DATE ANALYZED | PREP. HOLDING TIME, DAYS | ANALYSIS HOLDING TIME, DAYS | QUALIFIER |
|---|---|---|---|---|---|---|---|
| B09332 | ICP | 9/09/93 | 10/11/93 | 10/15/93 | | 36 | None |
| B09333 | ↓ | 9/10/93 | ↓ | ↓ | | 35 | ↓ |
| B09336 | ↓ | 9/10/93 | ↓ | ↓ | | 35 | ↓ |
| | | | | | | | |
| B09332 | As, Pb, Se, Tl | 9/09/93 | 10/11/93 | 10/12/93 | | 33 | None |
| B09333 | ↓ | 9/10/93 | ↓ | ↓ | 3/2/94 | ~~34~~ 32 | ↓ |
| B09336 | ↓ | 9/10/93 | ↓ | ↓ | 3/2/94 | ~~34~~ 32 | ↓ |
| | | | | | | | |
| B09332 | Hg | 9/9/93 | 9/30/93 | 10/04/93 | | 25 | None |
| B09333 | ↓ | 9/10/93 | ↓ | ↓ | | 24 | ↓ |
| B09336 | ↓ | ↓ | ↓ | ↓ | | 24 | ↓ |
| | | | | | | | |
| B09332 | CN | 9/9/93 | 9/20/93 | 9/21/93 | | 12 | None |
| B09333 | ↓ | 9/10/93 | ↓ | ↓ | | 11 | ↓ |
| B09336 | ↓ | ↓ | ↓ | ↓ | | 11 | ↓ |
| | | | | | | | |
| | | | | | | | |

WESTINGHOUSE/HANFORD

3
BLANKS

Lab Name: SKINNER & SHERMAN LABS. Contract: 68-D0-0108

Lab Code: SKINER Case No.: N3-09-046SAS No.: SDG No.: B09332

Preparation Blank Matrix (soil/water): SOIL

Preparation Blank Concentration Units (ug/L or mg/kg): MG/KG

| Analyte | Initial Calib. Blank (ug/L) | C | Continuing Calibration Blank (ug/L) 1 | C | 2 | C | 3 | C | Prepa-ration Blank | C | M | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Aluminum | 10.6 | U | 20.1 | B | 10.6 | U | 26.0 | B | 2.120 | U | P | |
| Antimony | 12.9 | U | 12.9 | U | -13.0 | B | 12.9 | U | 2.580 | U | P | |
| Arsenic | 1.7 | U | 1.7 | U | 1.7 | U | 1.7 | U | 0.340 | U | P | |
| Barium | 1.2 | U | 1.2 | U | 1.2 | U | 1.2 | U | 0.240 | U | P | |
| Beryllium | 0.2 | B | 0.2 | B | 0.3 | B | 0.3 | B | 0.078 | B | P | xS= 0.39 |
| Cadmium | 1.3 | U | 1.3 | U | 1.3 | U | 1.3 | U | 0.260 | U | P | |
| Calcium | 59.0 | U | 59.0 | U | 59.0 | U | 59.0 | U | 11.800 | U | P | |
| Chromium | 2.2 | B | 2.1 | U | 2.1 | U | 2.1 | U | 0.558 | B | P | |
| Cobalt | 2.6 | U | 2.6 | U | 2.6 | U | 2.6 | U | 0.520 | U | P | |
| Copper | 62.5 12.5 | B | 52 10.4 | B | 5.4 | B | 8.6 | B | 2.156 | B | P | xS=$10.78 |
| Iron | 5.3 | U | 7.4 | B | 12.5 | B | 10.6 | B | -2.758 | B | P | |
| Lead | 1.1 | U | 1.1 | U | 1.1 | U | 1.1 | U | 0.220 | U | P | |
| Magnesium | 22.9 | U | 22.9 | U | 22.9 | U | 38.9 | B | 4.580 | U | P | |
| Manganese | 0.8 | U | 1.0 | B | 1.2 | B | 1.2 | B | 0.160 | U | P | |
| Mercury | 0.1 | U | 0.1 | U | 0.1 | U | 0.1 | U | 0.050 | U | CV | |
| Nickel | 3.4 | U | 3.4 | U | 3.4 | U | 3.4 | U | 0.680 | U | P | |
| Potassium | 68.5 | U | 68.5 | U | 68.5 | U | 68.5 | U | 13.700 | U | P | |
| Selenium | 2.3 | U | 2.3 | U | 2.3 | U | 2.3 | U | 0.460 | U | P | |
| Silver | 2.6 | U | 2.6 | U | 2.6 | U | 2.6 | U | 0.520 | U | P | |
| Sodium | 114.4 | U | 114.4 | U | 114.4 | U | 114.4 | U | 22.880 | U | P | |
| Thallium | 2.2 | U | 2.2 | U | 2.3 | B | 2.2 | U | 0.440 | U | P | |
| Vanadium | 5.5 | U | 5.5 | U | 5.5 | U | 5.5 | U | 1.100 | U | P | |
| Zinc | 6.0 | B | 4.4 | U | 4.9 | B | 4.4 | U | 0.880 | U | P | |
| Cyanide | 10.0 | U | 10.0 | U | 10.0 | U | 10.0 | U | 0.500 | U | CA | |
| Titanium | 1.1 | U | 1.2 | B | 1.1 | U | 1.6 | B | 0.220 | U | P | |

Assoc. w/
B09332
B09333
B09336

3/2/94

9413225.1658

WESTINGHOUSE/HANFORD

5A

SPIKE SAMPLE RECOVERY

SAMPLE NUMBER:

B09336S

Lab Name: SKINNER & SHERMAN LABS. Contract: 68-D0-0108

Lab Code: SKINER Case No.: N3-09-046SAS No.: SDG No.: B09332

Matrix (soil/water): SOIL Level (low/med): LOW

% Solids for Sample: 96.9

Concentration Units (ug/L or mg/kg dry weight): MG/KG

| Analyte | Control Limit %R | Spiked Sample Result (SSR) | C | Sample Result (SR) | C | Spike Added (SA) | %R | Q | M |
|---|---|---|---|---|---|---|---|---|---|
| Aluminum | | | | | | | | | NR |
| Antimony | 75-125 | 72.0992 | | 2.5850 | U | 97.36 | 74.1 | N | P |
| Arsenic | 75-125 | 371.4781 | | 3.3010 | | 389.43 | 94.5 | | P |
| Barium | 75-125 | 413.5950 | | 42.0331 | | 389.43 | 95.4 | | P |
| Beryllium | 75-125 | 9.0406 | | 0.2124 | B | 9.74 | 90.6 | | P |
| Cadmium | 75-125 | 8.0495 | | 0.2605 | U | 9.74 | 82.6 | | P |
| Calcium | | | | | | | | | NR |
| Chromium | 75-125 | 42.0196 | | 7.1558 | | 38.94 | 89.5 | | P |
| Cobalt | 75-125 | 92.4859 | | 5.7371 | B | 97.36 | 89.1 | | P |
| Copper | 75-125 | 54.0141 | | 11.1235 | | 48.68 | 88.1 | | P |
| Iron | | | | | | | | | NR |
| Lead | 75-125 | 93.1752 | | 2.4345 | | 97.36 | 93.2 | | P |
| Magnesium | | | | | | | | | NR |
| Manganese | 75-125 | 771.3651 | | 183.7226 | | 97.36 | 603.6 | N | P |
| Mercury | 75-125 | 0.5434 | | 0.0469 | U | 0.49 | 110.9 | | CV |
| Nickel | 75-125 | 94.0690 | | 5.8232 | B | 97.36 | 90.6 | | P |
| Potassium | | | | | | | | | NR |
| Selenium | 75-125 | 364.5852 | | 0.4609 | U | 389.43 | 93.6 | | P |
| Silver | 75-125 | 9.5800 | | 0.5210 | U | 9.74 | 98.4 | | P |
| Sodium | | | | | | | | | NR |
| Thallium | 75-125 | 359.0747 | | 0.4409 | U | 389.43 | 92.2 | | P |
| Vanadium | 75-125 | 110.5380 | | 26.7356 | | 97.36 | 86.1 | | P |
| Zinc | 75-125 | 110.6431 | | 26.1124 | | 97.36 | 86.8 | | P |
| Cyanide | 75-125 | 25.6329 | | 0.4734 | U | 25.29 | 101.4 | | CA |
| Titanium | | 784.3332 | | 830.5830 | | 97.36 | -47.5 | | P |

Comments: - No qualifier is necessary for titanium since the sample result is greater than 4x spiked amount.

- ~~Qualify all antimony results as estimated (J/UJ).~~

- ~~Qualify all manganese positive sample results~~ as estimated (J).

15

FORM V (Part 1) - IN 3/02/94 OILM02.1

022

9413225.1659

WESTINGHOUSE/HANFORD

6

DUPLICATES

SAMPLE NUMBER: B09336D

Lab Name: SKINNER & SHERMAN LABS. Contract: 68-D0-0108

Lab Code: SKINER Case No.: N3-09-046SAS No.: SDG No.: B09332

Matrix (soil/water): SOIL Level (low/med): LOW

% Solids for Sample: 96.9 % Solids for Duplicate: 97.0

Concentration Units (ug/L or mg/kg dry weight): MG/KG

| Analyte | Control Limit | Sample (S) | C | Duplicate (D) | C | RPD | Q | M |
|---|---|---|---|---|---|---|---|---|
| Aluminum | | 4878.4153 | | 5046.7402 | | 3.4 | | P |
| Antimony | | 2.5850 | U | 2.5850 | U | | | P |
| Arsenic | 2.0 | 3.3010 | | 2.7395 | | 18.6 | | P |
| Barium | 40.1 | 42.0331 | | 153.9812 | | 114.2 | * | P |
| Beryllium | | 0.2124 | B | 0.2425 | B | 13.2 | | P |
| Cadmium | | 0.2605 | U | 0.2605 | U | | | P |
| Calcium | | 7963.3693 | | 7499.6744 | | 6.0 | | P |
| Chromium | 2.0 | 7.1558 | | 8.8511 | | 21.2 | | P |
| Cobalt | | 5.7371 | B | 7.2680 | B | 23.5 | | P |
| Copper | 5.0 | 11.1235 | | 12.5843 | | 12.3 | | P |
| Iron | | 12478.8842 | | 12188.7242 | | 2.4 | | P |
| Lead | 0.6 | 2.4345 | | 2.6072 | | 6.9 | | P |
| Magnesium | 1001.9 | 3988.6982 | | 4372.2384 | | 9.2 | | P |
| Manganese | | 183.7226 | | 555.8127 | | 100.6 | * | P |
| Mercury | | 0.0469 | U | 0.0491 | U | | | CV |
| Nickel | 8.0 | 5.8232 | B | 8.2960 | | 35.0 | | P |
| Potassium | | 728.8467 | B | 796.4572 | B | 8.9 | | P |
| Selenium | | 0.4609 | U | 0.4712 | B | 200.0 | | P |
| Silver | | 0.5210 | U | 0.5210 | U | | | P |
| Sodium | | 172.1723 | B | 210.7868 | B | 20.2 | | P |
| Thallium | | 0.4409 | U | 0.4409 | U | | | P |
| Vanadium | 10.0 | 26.7356 | | 25.3990 | | 5.1 | | P |
| Zinc | | 26.1124 | | 26.5292 | | 1.6 | | P |
| Cyanide | | 0.4734 | U | 0.5109 | U | | | CA |
| Titanium | | 830.5830 | | 681.5153 | | 19.7 | | P |

Qualify positive results for barium and manganese as estimated (J).

3/22/94

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FORM VI - IN ILM02.1

023

SEMIVOLATILE ORGANIC DATA VALIDATION SUMMARY FOR DATA PACKAGE:
B09332-TMA-611 (923-E418, Filename B09332.BNA)

9453549D

MEMORANDUM

MAR 1994
RECEIVED
TQC

TO: 200-UP-2 Project QA Record

March 3, 1994

FR: Susan Winter, Golder Associates Inc.

RE: SEMIVOLATILE ORGANIC DATA VALIDATION SUMMARY FOR DATA PACKAGE: B09332-TMA-611 (923-E418, Filename B09332.BNA)

## INTRODUCTION

This memo presents the results of data validation on data package B09332-TMA-611 prepared by the Thermo Analytical (TMA) laboratory. A list of samples validated along with the analyses reported and the method of analysis is provided in the following table.

| SAMPLE ID | SAMPLE DATE | MEDIA | ANALYSIS |
|---|---|---|---|
| B09332<br>B09333<br>B09336 | 09/09/93<br>09/10/93<br>09/10/93 | SOIL<br>SOIL<br>SOIL | SEE NOTE 1 |
| Note 1. All samples were analyzed for CLP TCL Semivolatile Organic Constituents. | | | |

Data validation was conducted in accordance with the WHC statement of work (WHC 1993a) and validation procedures (WHC 1993b). Attachments 1 through 5 provide the following information as indicated below:

Attachment 1. Glossary of Data Reporting Qualifiers
Attachment 2. Summary of Data Qualifications
Attachment 3. Qualified Data Summary and Annotated Laboratory Reports
Attachment 4. Laboratory Narrative and Chain-of-Custody Documentation
Attachment 5. Data Validation Supporting Documentation

## DATA QUALITY OBJECTIVES

**Precision.** Goals for precision were met.

**Accuracy.** Goals for accuracy were met.

**Sample Result Verification.** All sample results were supported in the raw data.

**Detection Limits.** Detection limit goals were met for all sample results as specified in the reference analytical method.

**Completeness.** The data package was complete for all requested analyses. A total of three samples were validated in this data package with a total of 192 determinations reported, all of which were deemed valid. This results in a completeness of 100 percent, which meets normal work plan objectives of 90%.

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-001

## MAJOR DEFICIENCIES

The following major deficiencies were identified during data validation which required qualification of data as unusable.

- The tentatively identified compound (TIC) identified as 4-hydroxy-4-methyl-2-pentanone has been qualified as unusable (UR) since it is an aldol condensation product, a suspected laboratory contaminant. Attachments 2 and 5 provide a summary of the samples affected, data qualifications applied and supporting documentation. However, these qualifications do not affect the percent completeness since the TICs are not TCL compounds.

## MINOR DEFICIENCIES

The following minor deficiencies were identified during data validation which required qualification of data.

### Laboratory Blanks

- Di-n-butylphthalate, bis(2-ethylhexyl)phthalate, pyrene, and two TICs, as listed in Attachment 2, were detected in the associated laboratory blank. Attachments 2 and 5 provide a summary of the samples affected, data qualifications applied and supporting documentation.

## REFERENCES

WHC 1993a, Validation of 200-UP-2 Data, Statement of Work, Analytical Laboratory Data Validation, Task Order S-94-18, December 14, 1993, Purchase Order M073750. Westinghouse Hanford Company, Richland, Washington.

WHC 1993b, Data Validation Procedures for Chemical Analyses, WHC-SD-EN-SPP-002, Rev. 2, 1993. Westinghouse Hanford Company, Richland, Washington.

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ATTACHMENT 1

GLOSSARY OF DATA REPORTING QUALIFIERS

9413225.1664

## GLOSSARY OF ORGANIC DATA REPORTING QUALIFIERS

B - Indicates the constituent was analyzed for and detected in the associated laboratory blank. This qualifier is applied by the laboratory. During the process of data validation this qualifier may be replaced by other appropriate qualifiers as defined by the validation procedures. The associated data should be considered usable for decision making purposes.

U - Indicates the constituent was analyzed for and not detected. The concentration reported is the sample quantitation limit corrected for aliquot size, dilution and percent solids (in the case of solid matrices) by the laboratory. The associated data should be considered usable for decision making purposes.

UJ - Indicates the constituent was analyzed for and not detected. Due to a minor quality control deficiency identified during data validation the concentration reported may not accurately reflect the sample quantitation limit. The associated data should be considered usable for decision making purposes.

J - Indicates the constituent was analyzed for and detected. This qualifier may be applied by the laboratory to indicate a concentration which is less than the contract required quantitation limit (CRQL) but greater than the instrument detection limit (IDL). During data validation this qualifier may be applied to indicate a minor quality control deficiency. However in either case, the associated data should be considered usable for decision making purposes.

NJ - Indicates presumptive evidence of a constituent at an estimated value. This qualifier is normally applied to GC analysis data (such as organochlorine pesticide and PCB data). The associated data should be considered usable for decision making purposes.

N - Indicates presumptive evidence of a constituent. This qualifier is normally applied to GC analysis data (such as organochlorine pesticide and PCB data). The associated data should be considered usable for decision making purposes.

JN - Indicates a tentatively identified compound (TIC) whose concentration and identification have been determined to be valid as a result of data validation. The associated data should be considered usable for decision making purposes.

UJN - Indicates a tentatively identified compound (TIC) that has been determined to be presumptive and valid (JN) in terms of identification and quantitation and has been qualified as undetected (U) due to associated blank contamination.

UR - Indicates the constituent was analyzed for and not detected. The concentration reported has been qualified as unusable due to a major quality control deficiency identified during data validation. The associated data should be considered unusable for decision making purposes.

R - Indicates the constituent was analyzed for and detected. The concentration reported has been qualified as unusable due to a major quality control deficiency identified during data validation. The associated data should be considered unusable for decision making purposes.

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ATTACHMENT 2

SUMMARY OF DATA QUALIFICATIONS

9413225.1666

# DATA QUALIFICATION SUMMARY

| SDG: B09332-TMA-611 | VALIDATOR: | DATE: March 24, 1994 | PAGE 1 OF 1 |
|---|---|---|---|
| COMMENTS: SEMIVOLATILE ORGANICS | | | |
| COMPOUND | QUALIFIER | SAMPLES AFFECTED | REASON |
| DI-N-BUTYLPHTHALATE | U | B09332<br>B09333<br>B09336 | PRESENT IN LABORATORY BLANK |
| BIS(2-ETHYLHEXYL)PHTHALATE | U | B09332<br>B09333<br>B09336 | PRESENT IN LABORATORY BLANK |
| PHENOL | U | B09336 | PRESENT IN LABORATORY BLANK |
| 4-HYDROXY-4-METHYL-2-PENTANONE | U | B09332<br>B09333<br>B09336 | PRESENT IN LABORATORY BLANK |
| 4-HYDROXY-4-METHYL-2-PENTANONE | UR | B09332<br>B09333<br>B09336 | SUSPECTED LABORATORY CONTAMINANT (ALDOL CONDENSATE) |
| UNKNOWN HYDROCARBON @ RT 6.85 MINUTES | UJN | B09332<br>B09333 | PRESENT IN BLANK |
| UNKNOWN HYDROCARBON @ RT 6.87 MINUTES | UJN | B09336 | PRESENT IN BLANK |
| UNKNOWN HYDROCARBONS @ RT 7.42 AND 8.73 MINUTES | JN | B09333 | IDENTIFIED AS A VALID RESULT USING DATA VALIDATION PROCEDURES |
| PROPANOIC ACID ESTER ISOMER @ RT 18.1 MINUTES | JN | B09333 | IDENTIFIED AS A VALID RESULT USING DATA VALIDATION PROCEDURES |
| HEXANEDIOIC ACID ESTER ISOMER @ RT 26.22 MINUTES | JN | B09333 | IDENTIFIED AS A VALID RESULT USING DATA VALIDATION PROCEDURES |
| UNKNOWN HYDROCARBON @ RT 7.45 MINUTES | JN | B09336 | IDENTIFIED AS A VALID RESULT USING DATA VALIDATION PROCEDURES |
| HEXANEDIOIC ACID ESTER ISOMER @ RT 26.23 MINUTES | JN | B09336 | IDENTIFIED AS A VALID RESULT USING DATA VALIDATION PROCEDURES |
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| | | | |
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| | | | |
| | | | |

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ATTACHMENT 3

QUALIFIED DATA SUMMARY AND ANNOTATED LABORATORY REPORTS

9W3225.1660

Validated Data Summary, Data Package: B09332-TMA-611

| | Samp# | B09332 | | B09333 | | B09336 | |
|---|---|---|---|---|---|---|---|
| | Date | 9-9-93 | | 9-10-93 | | 9-10-93 | |
| | Location | 299-W19-95 | | 299-W19-97 | | 299-W19-95 | |
| | Depth | 60.00 - 62.50 | | 50.00 - 52.50 | | 74.80 - 77.30 | |
| | Type | --- | | --- | | --- | |
| | Comments | --- | | --- | | --- | |
| Parameter | Units | Result | Q | Result | Q | Result | Q |
| PHENOL | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| BIS(2-CHLOROETHYL)ETHER | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| 2-CHLOROPHENOL | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| 1,3-DICHLOROBENZENE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| 1,4-DICHLOROBENZENE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| 1,2-DICHLOROBENZENE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| 2-METHYLPHENOL | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| 2,2'-OXYBIS(1-CHLOROPROPANE) | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| 4-METHYLPHENOL | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| N-NITROSO-DI-N-PROPYLAMINE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| HEXACHLOROETHANE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| NITROBENZENE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| ISOPHORONE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| 2-NITROPHENOL | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| 2,4-DIMETHYLPHENOL | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| BIS(2-CHLOROETHOXY)METHANE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| 2,4-DICHLOROPHENOL | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| 1,2,4-TRICHLOROBENZENE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| NAPHTHALENE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| 4-CHLOROANILINE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| HEXACHLOROBUTADIENE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| 4-CHLORO-3-METHYLPHENOL | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| 2-METHYLNAPHTHALENE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| HEXACHLOROCYCLOPENTADIENE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| 2,4,6-TRICHLOROPHENOL | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| 2,4,5-TRICHLOROPHENOL | UG/KG | 840.000 | U | 940.000 | U | 800.000 | U |
| 2-CHLORONAPHTHALENE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| 2-NITROANILINE | UG/KG | 840.000 | U | 940.000 | U | 800.000 | U |
| DIMETHYLPHTHALATE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| ACENAPHTHYLENE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| 3-NITROANILINE | UG/KG | 840.000 | U | 940.000 | U | 800.000 | U |
| ACENAPHTHENE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |

Verified
[illegible] 3/03/94

Validated Data Summary, Data Package: B09332-TMA-611

| | Sample# | B09332 | | B09333 | | B09336 | |
|---|---|---|---|---|---|---|---|
| | Date | 9-9-93 | | 9-10-93 | | 9-10-93 | |
| | Location | 299-W19-95 | | 299-W19-97 | | 299-W19-95 | |
| | Depth | 60.00 - 62.50 | | 50.00 - 52.50 | | 74.80 - 77.30 | |
| | Type | --- | | --- | | --- | |
| | Comments | --- | | --- | | --- | |
| Parameter | Units | Result | Q | Result | Q | Result | Q |
| 2,4-DINITROPHENOL | UG/KG | 840.000 | U | 940.000 | U | 800.000 | U |
| 4-NITROPHENOL | UG/KG | 840.000 | U | 940.000 | U | 800.000 | U |
| DIBENZOFURAN | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| 2,4-DINITROTOLUENE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| 2,6-DINITROTOLUENE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| DIETHYLPHTHALATE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| 4-CHLOROPHENYL-PHENYLETHER | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| FLUORENE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| 4-NITROANILINE | UG/KG | 840.000 | U | 940.000 | U | 800.000 | U |
| 4,6-DINITRO-2-METHYLPHENOL | UG/KG | 840.000 | U | 940.000 | U | 800.000 | U |
| N-NITROSODIPHENYLAMINE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| 4-BROMOPHENYL-PHENYLETHER | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| HEXACHLOROBENZENE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| PENTACHLOROPHENOL | UG/KG | 840.000 | U | 940.000 | U | 800.000 | U |
| PHENANTHRENE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| ANTHRACENE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| CARBAZOLE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| DI-N-BUTYLPHTHALATE | UG/KG | 420.000 | U | 390.000 | U | 330.000 | U |
| FLUORANTHENE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| PYRENE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| BUTYLBENZYLPHTHALATE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| 3,3'-DICHLOROBENZIDINE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| BENZO(A)ANTHRACENE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| BIS(2-ETHYLHEXYL)PHTHALATE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| CHRYSENE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| DI-N-OCTYLPHTHALATE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| BENZO(B)FLUORANTHENE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| BENZO(K)FLUORANTHENE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| BENZO(A)PYRENE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| INDENO(1,2,3-CD)PYRENE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| DIBENZ(A,H)ANTHRACENE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| BENZO(G,H,I)PERYLENE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |

Verified
3/03/94

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
299-W19-95
B09332
60-62.5'

Lab Name: TMA/ARLI Contract: WHC

Lab Code: TMALA Case No.: 09028 SAS No.: NA SDG No.: NA

Matrix: (soil/water) SOIL Lab Sample ID: A309028-01D

Sample wt/vol: 30.4 (g/mL) G Lab File ID: 30928S03

Level: (low/med) LOW Date Received: 09/14/93

% Moisture: 6 decanted: (Y/N) N Date Extracted: 09/16/93

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 09/28/93

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 9.4

| CAS NO. | COMPOUND | CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG | Q |
|---|---|---|---|
| 108-95-2 | Phenol | 350 | U |
| 111-44-4 | bis(2-Chloroethyl)Ether | 350 | U |
| 95-57-8 | 2-Chlorophenol | 350 | U |
| 541-73-1 | 1,3-Dichlorobenzene | 350 | U |
| 106-46-7 | 1,4-Dichlorobenzene | 350 | U |
| 95-50-1 | 1,2-Dichlorobenzene | 350 | U |
| 95-48-7 | 2-Methylphenol | 350 | U |
| 108-60-1 | 2,2'-oxybis(1-Chloropropane) | 350 | U |
| 106-44-5 | 4-Methylphenol | 350 | U |
| 621-64-7 | N-Nitroso-Di-n-Propylamine | 350 | U |
| 67-72-1 | Hexachloroethane | 350 | U |
| 98-95-3 | Nitrobenzene | 350 | U |
| 78-59-1 | Isophorone | 350 | U |
| 88-75-5 | 2-Nitrophenol | 350 | U |
| 105-67-9 | 2,4-Dimethylphenol | 350 | U |
| 111-91-1 | bis(2-Chloroethoxy)Methane | 350 | U |
| 120-83-2 | 2,4-Dichlorophenol | 350 | U |
| 120-82-1 | 1,2,4-Trichlorobenzene | 350 | U |
| 91-20-3 | Naphthalene | 350 | U |
| 106-47-8 | 4-Chloroaniline | 350 | U |
| 87-68-3 | Hexachlorobutadiene | 350 | U |
| 59-50-7 | 4-Chloro-3-Methylphenol | 350 | U |
| 91-57-6 | 2-Methylnaphthalene | 350 | U |
| 77-47-4 | Hexachlorocyclopentadiene | 350 | U |
| 88-06-2 | 2,4,6-Trichlorophenol | 350 | U |
| 95-95-4 | 2,4,5-Trichlorophenol | 840 | U |
| 91-58-7 | 2-Chloronaphthalene | 350 | U |
| 88-74-4 | 2-Nitroaniline | 840 | U |
| 131-11-3 | Dimethylphthalate | 350 | U |
| 208-96-8 | Acenaphthylene | 350 | U |
| 99-09-2 | 3-Nitroaniline | 840 | U |
| 83-32-9 | Acenaphthene | 350 | U |
| 51-28-5 | 2,4-Dinitrophenol | 840 | U |

FORM I SV-1

Verified

3/3/94

9413225.1671

1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
299-W19-95
B09332
60-62.5'

Lab Name: TMA/ARLI Contract: WHC

Lab Code: TMALA Case No.: 09028 SAS No.: NA SDG No.: NA

Matrix: (soil/water) SOIL Lab Sample ID: A309028-01D

Sample wt/vol: 30.4 (g/mL) G Lab File ID: 30928S03

Level: (low/med) LOW Date Received: 09/14/93

% Moisture: 6 decanted: (Y/N) N Date Extracted: 09/16/93

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 09/28/93

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 9.4

9413225.1672

| CAS NO. | COMPOUND | CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG | Q | Q |
|---|---|---|---|---|
| 100-02-7 | 4-Nitrophenol | 840 | U | |
| 132-64-9 | Dibenzofuran | 350 | U | |
| 121-14-2 | 2,4-Dinitrotoluene | 350 | U | |
| 606-20-2 | 2,6-Dinitrotoluene | 350 | U | |
| 84-66-2 | Diethylphthalate | 350 | U | |
| 7005-72-3 | 4-Chlorophenyl-phenylether | 350 | U | |
| 86-73-7 | Fluorene | 350 | U | |
| 100-01-6 | 4-Nitroaniline | 840 | U | |
| 534-52-1 | 4,6-Dinitro-2-methylphenol | 840 | U | |
| 86-30-6 | N-Nitrosodiphenylamine (1) | 350 | U | |
| 101-55-3 | 4-Bromophenyl-phenylether | 350 | U | |
| 118-74-1 | Hexachlorobenzene | 350 | U | |
| 87-86-5 | Pentachlorophenol | 840 | U | |
| 85-01-8 | Phenanthrene | 350 | U | |
| 120-12-7 | Anthracene | 350 | U | |
| 86-74-8 | Carbazole | 350 | U | |
| 84-74-2 | Di-n-Butylphthalate | 420 | ~~B~~ | U |
| 206-44-0 | Fluoranthene | 350 | U | |
| 129-00-0 | Pyrene | 350 | U | |
| 85-68-7 | Butylbenzylphthalate | 350 | U | |
| 91-94-1 | 3,3'-Dichlorobenzidine | 350 | U | |
| 56-55-3 | Benzo(a)Anthracene | 350 | U | |
| 117-81-7 | bis(2-Ethylhexyl)Phthalate | 350 ~~56~~ | ~~BJ~~ | U |
| 218-01-9 | Chrysene | 350 | U | |
| 117-84-0 | Di-n-Octyl Phthalate | 350 | U | |
| 205-99-2 | Benzo(b)Fluoranthene | 350 | U | |
| 207-08-9 | Benzo(k)Fluoranthene | 350 | U | |
| 50-32-8 | Benzo(a)Pyrene | 350 | U | |
| 193-39-5 | Indeno(1,2,3-cd)Pyrene | 350 | U | |
| 53-70-3 | Dibenz(a,h)Anthracene | 350 | U | |
| 191-24-2 | Benzo(g,h,i)Perylene | 350 | U | |

(1) - Cannot be separated from Diphenylamine

Verified

FORM I SV-2

3/3/94 3/90

01

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.
299-W19-95

B09332
60-62.5'

Lab Name: TMA/ARLI Contract: WHC

Lab Code: TMALA Case No.: 09028 SAS No.: NA SDG No.: NA

Matrix: (soil/water) SOIL Lab Sample ID: A309028-01D

Sample wt/vol: 30.4 (g/mL) G Lab File ID: 30928S03

Level: (low/med) LOW Date Received: 09/14/93

% Moisture: 6 decanted: (Y/N) N Date Extracted: 09/16/93

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 09/28/93

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 9.4

Number TICs found: 2

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

| CAS NUMBER | COMPOUND NAME | RT | EST. CONC. | Q |
|---|---|---|---|---|
| ~~1. 123-42-2~~ | ~~4-HYDROXY-4-METHYL-2-PENTANO~~ | ~~6.28~~ | ~~30000~~ | ~~BJ~~ |
| 2. | UNKNOWN HYDROCARBON | 6.85 | 70 | ~~BJ~~ |

U R U 4

9413225.1673

Verified

FORM I SV-TIC

012

3/90

1B

# SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

299-W19-97

B09333

SC-52.5'

Lab Name: TMA/ARLI Contract: WHC

Lab Code: TMALA Case No.: 09028 SAS No.: NA SDG No.: NA

Matrix: (soil/water) SOIL Lab Sample ID: A309028-02B

Sample wt/vol: 30.7 (g/mL) G Lab File ID: 30928S04

Level: (low/med) LOW Date Received: 09/14/93

% Moisture: 17 decanted: (Y/N) N Date Extracted: 09/16/93

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 09/28/93

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 8.9

| CAS NO. | COMPOUND | CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG | Q |
|---|---|---|---|
| 108-95-2 | Phenol | 390 | U |
| 111-44-4 | bis(2-Chloroethyl)Ether | 390 | U |
| 95-57-8 | 2-Chlorophenol | 390 | U |
| 541-73-1 | 1,3-Dichlorobenzene | 390 | U |
| 106-46-7 | 1,4-Dichlorobenzene | 390 | U |
| 95-50-1 | 1,2-Dichlorobenzene | 390 | U |
| 95-48-7 | 2-Methylphenol | 390 | U |
| 108-60-1 | 2,2'-oxybis(1-Chloropropane) | 390 | U |
| 106-44-5 | 4-Methylphenol | 390 | U |
| 621-64-7 | N-Nitroso-Di-n-Propylamine | 390 | U |
| 67-72-1 | Hexachloroethane | 390 | U |
| 98-95-3 | Nitrobenzene | 390 | U |
| 78-59-1 | Isophorone | 390 | U |
| 88-75-5 | 2-Nitrophenol | 390 | U |
| 105-67-9 | 2,4-Dimethylphenol | 390 | U |
| 111-91-1 | bis(2-Chloroethoxy)Methane | 390 | U |
| 120-83-2 | 2,4-Dichlorophenol | 390 | U |
| 120-82-1 | 1,2,4-Trichlorobenzene | 390 | U |
| 91-20-3 | Naphthalene | 390 | U |
| 106-47-8 | 4-Chloroaniline | 390 | U |
| 87-68-3 | Hexachlorobutadiene | 390 | U |
| 59-50-7 | 4-Chloro-3-Methylphenol | 390 | U |
| 91-57-6 | 2-Methylnaphthalene | 390 | U |
| 77-47-4 | Hexachlorocyclopentadiene | 390 | U |
| 88-06-2 | 2,4,6-Trichlorophenol | 390 | U |
| 95-95-4 | 2,4,5-Trichlorophenol | 940 | U |
| 91-58-7 | 2-Chloronaphthalene | 390 | U |
| 88-74-4 | 2-Nitroaniline | 940 | U |
| 131-11-3 | Dimethylphthalate | 390 | U |
| 208-96-8 | Acenaphthylene | 390 | U |
| 99-09-2 | 3-Nitroaniline | 940 | U |
| 83-32-9 | Acenaphthene | 390 | U |
| 51-28-5 | 2,4-Dinitrophenol | 940 | U |

FORM I SV-1

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013

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1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
299-W19-97

B09333
50-52.5'

Lab Name: TMA/ARLI Contract: WHC

Lab Code: TMALA Case No.: 09028 SAS No.: NA SDG No.: NA

Matrix: (soil/water) SOIL Lab Sample ID: A309028-02B

Sample wt/vol: 30.7 (g/mL) G Lab File ID: 30928S04

Level: (low/med) LOW Date Received: 09/14/93

% Moisture: 17 decanted: (Y/N) N Date Extracted: 09/16/93

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 09/28/93

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 8.9

| CAS NO. | COMPOUND | CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG | Q | Q |
|---|---|---|---|---|
| 100-02-7 | 4-Nitrophenol | 940 | U | |
| 132-64-9 | Dibenzofuran | 390 | U | |
| 121-14-2 | 2,4-Dinitrotoluene | 390 | U | |
| 606-20-2 | 2,6-Dinitrotoluene | 390 | U | |
| 84-66-2 | Diethylphthalate | 390 | U | |
| 7005-72-3 | 4-Chlorophenyl-phenylether | 390 | U | |
| 86-73-7 | Fluorene | 390 | U | |
| 100-01-6 | 4-Nitroaniline | 940 | U | |
| 534-52-1 | 4,6-Dinitro-2-methylphenol | 940 | U | |
| 86-30-6 | N-Nitrosodiphenylamine (1) | 390 | U | |
| 101-55-3 | 4-Bromophenyl-phenylether | 390 | U | |
| 118-74-1 | Hexachlorobenzene | 390 | U | |
| 87-86-5 | Pentachlorophenol | 940 | U | |
| 85-01-8 | Phenanthrene | 390 | U | |
| 120-12-7 | Anthracene | 390 | U | |
| 86-74-8 | Carbazole | 390 | U | |
| 84-74-2 | Di-n-Butylphthalate | 390 ~~290~~ | ~~35~~ | 4 |
| 206-44-0 | Fluoranthene | 390 | U | |
| 129-00-0 | Pyrene | 390 | U | |
| 85-68-7 | Butylbenzylphthalate | 390 | U | |
| 91-94-1 | 3,3'-Dichlorobenzidine | 390 | U | |
| 56-55-3 | Benzo(a)Anthracene | 390 | U | |
| 117-81-7 | bis(2-Ethylhexyl)Phthalate | 390 ~~34~~ | ~~35~~ | 4 |
| 218-01-9 | Chrysene | 390 | U | |
| 117-84-0 | Di-n-Octyl Phthalate | 390 | U | |
| 205-99-2 | Benzo(b)Fluoranthene | 390 | U | |
| 207-08-9 | Benzo(k)Fluoranthene | 390 | U | |
| 50-32-8 | Benzo(a)Pyrene | 390 | U | |
| 193-39-5 | Indeno(1,2,3-cd)Pyrene | 390 | U | |
| 53-70-3 | Dibenz(a,h)Anthracene | 390 | U | |
| 191-24-2 | Benzo(g,h,i)Perylene | 390 | U | |

(1) - Cannot be separated from Diphenylamine

FORM I SV-2

3/3/94 3/90

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1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.
299-W19-97

B09333
50-52.5'

Lab Name: TMA/ARLI Contract: WHC

Lab Code: TMALA Case No.: 09028 SAS No.: NA SDG No.: NA

Matrix: (soil/water) SOIL Lab Sample ID: A309028-02B

Sample wt/vol: 30.7 (g/mL) G Lab File ID: 30928S04

Level: (low/med) LOW Date Received: 09/14/93

% Moisture: 17 decanted: (Y/N) N Date Extracted: 09/16/93

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 09/28/93

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 8.9

9413225.1676

Number TICs found: 6

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

| CAS NUMBER | COMPOUND NAME | RT | EST. CONC. | Q |
|---|---|---|---|---|
| ~~1. 123-42-2~~ | ~~4-HYDROXY-4-METHYL-2-PENTANO~~ | ~~6.28~~ | ~~82000~~ | ~~BAJ~~ |
| 2. | UNKNOWN HYDROCARBON | 6.35 | 79 | ~~BJ~~ |
| 3. | UNKNOWN HYDROCARBON | 7.42 | 1300 | ~~J~~ |
| 4. | UNKNOWN HYDROCARBON | 8.73 | 120 | ~~J~~ |
| 5. | PROPANOIC ACID ESTER ISOMER | 18.10 | 350 | ~~J~~ |
| 6. | HEXANEDIOIC ACID ESTER ISOME | 26.22 | 270 | ~~J~~ |

JN

Verified

015

FORM I SV-TIC 3/90

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
299-W19-95
B09336
74.8-77.3'

Lab Name: TMA/ARLI Contract: WHC

Lab Code: TMALA Case No.: 09028 SAS No.: NA SDG No.: NA

Matrix: (soil/water) SOIL Lab Sample ID: A309028-03B

Sample wt/vol: 30.8 (g/mL) G Lab File ID: 30928S07

Level: (low/med) LOW Date Received: 09/14/93

% Moisture: 3 decanted: (Y/N) N Date Extracted: 09/16/93

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 09/28/93

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 9.4

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| CAS NO. | COMPOUND | CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG | Q | Q |
|---|---|---|---|---|
| 108-95-2 | Phenol | 330 ~~50~~ | ~~J~~ | U |
| 111-44-4 | bis(2-Chloroethyl)Ether | 330 | U | |
| 95-57-8 | 2-Chlorophenol | 330 | U | |
| 541-73-1 | 1,3-Dichlorobenzene | 330 | U | |
| 106-46-7 | 1,4-Dichlorobenzene | 330 | U | |
| 95-50-1 | 1,2-Dichlorobenzene | 330 | U | |
| 95-48-7 | 2-Methylphenol | 330 | U | |
| 108-60-1 | 2,2'-oxybis(1-Chloropropane) | 330 | U | |
| 106-44-5 | 4-Methylphenol | 330 | U | |
| 621-64-7 | N-Nitroso-Di-n-Propylamine | 330 | U | |
| 67-72-1 | Hexachloroethane | 330 | U | |
| 98-95-3 | Nitrobenzene | 330 | U | |
| 78-59-1 | Isophorone | 330 | U | |
| 88-75-5 | 2-Nitrophenol | 330 | U | |
| 105-67-9 | 2,4-Dimethylphenol | 330 | U | |
| 111-91-1 | bis(2-Chloroethoxy)Methane | 330 | U | |
| 120-83-2 | 2,4-Dichlorophenol | 330 | U | |
| 120-82-1 | 1,2,4-Trichlorobenzene | 330 | U | |
| 91-20-3 | Naphthalene | 330 | U | |
| 106-47-8 | 4-Chloroaniline | 330 | U | |
| 87-68-3 | Hexachlorobutadiene | 330 | U | |
| 59-50-7 | 4-Chloro-3-Methylphenol | 330 | U | |
| 91-57-6 | 2-Methylnaphthalene | 330 | U | |
| 77-47-4 | Hexachlorocyclopentadiene | 330 | U | |
| 88-06-2 | 2,4,6-Trichlorophenol | 330 | U | |
| 95-95-4 | 2,4,5-Trichlorophenol | 800 | U | |
| 91-58-7 | 2-Chloronaphthalene | 330 | U | |
| 88-74-4 | 2-Nitroaniline | 800 | U | |
| 131-11-3 | Dimethylphthalate | 330 | U | |
| 208-96-8 | Acenaphthylene | 330 | U | |
| 99-09-2 | 3-Nitroaniline | 800 | U | |
| 83-32-9 | Acenaphthene | 330 | U | |
| 51-28-5 | 2,4-Dinitrophenol | 800 | U | |

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Verified 3/3/94

016

1C

# SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

~~000241~~
EPA SAMPLE NO.
299-W19-95

B09336
74.8-77.3'

Lab Name: TMA/ARLI Contract: WHC

Lab Code: TMALA Case No.: 09028 SAS No.: NA SDG No.: NA

Matrix: (soil/water) SOIL Lab Sample ID: A309028-03B

Sample wt/vol: 30.8 (g/mL) G Lab File ID: 30928S07

Level: (low/med) LOW Date Received: 09/14/93

% Moisture: 3 decanted: (Y/N) N Date Extracted: 09/16/93

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 09/28/93

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 9.4

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| CAS NO. | COMPOUND | CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG | Q | Q |
|---|---|---|---|---|
| 100-02-7 | 4-Nitrophenol | 800 | U | |
| 132-64-9 | Dibenzofuran | 330 | U | |
| 121-14-2 | 2,4-Dinitrotoluene | 330 | U | |
| 606-20-2 | 2,6-Dinitrotoluene | 330 | U | |
| 84-66-2 | Diethylphthalate | 330 | U | |
| 7005-72-3 | 4-Chlorophenyl-phenylether | 330 | U | |
| 86-73-7 | Fluorene | 330 | U | |
| 100-01-6 | 4-Nitroaniline | 800 | U | |
| 534-52-1 | 4,6-Dinitro-2-methylphenol | 800 | U | |
| 86-30-6 | N-Nitrosodiphenylamine (1) | 330 | U | |
| 101-55-3 | 4-Bromophenyl-phenylether | 330 | U | |
| 118-74-1 | Hexachlorobenzene | 330 | U | |
| 87-86-5 | Pentachlorophenol | 800 | U | |
| 85-01-8 | Phenanthrene | 330 | U | |
| 120-12-7 | Anthracene | 330 | U | |
| 86-74-8 | Carbazole | 330 | U | |
| 84-74-2 | Di-n-Butylphthalate | 330 ~~260~~ | ~~BJ~~ | U |
| 206-44-0 | Fluoranthene | 330 | U | |
| 129-00-0 | Pyrene | 330 | U | |
| 85-68-7 | Butylbenzylphthalate | 330 | U | |
| 91-94-1 | 3,3'-Dichlorobenzidine | 330 | U | |
| 56-55-3 | Benzo(a)Anthracene | 330 | U | |
| 117-81-7 | bis(2-Ethylhexyl)Phthalate | 330 ~~180~~ | ~~BJ~~ | U |
| 218-01-9 | Chrysene | 330 | U | |
| 117-84-0 | Di-n-Octyl Phthalate | 330 | U | |
| 205-99-2 | Benzo(b)Fluoranthene | 330 | U | |
| 207-08-9 | Benzo(k)Fluoranthene | 330 | U | |
| 50-32-8 | Benzo(a)Pyrene | 330 | U | |
| 193-39-5 | Indeno(1,2,3-cd)Pyrene | 330 | U | |
| 53-70-3 | Dibenz(a,h)Anthracene | 330 | U | |
| 191-24-2 | Benzo(g,h,i)Perylene | 330 | U | |

(1) - Cannot be separated from Diphenylamine

verified

3/3/94

017

FORM I SV-2 3/90

1F
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.
299-W19-95
B09336
74.8-77.3'

Lab Name: TMA/ARLI Contract: WHC

Lab Code: TMALA Case No.: 09028 SAS No.: NA SDG No.: NA

Matrix: (soil/water) SOIL Lab Sample ID: A309028-03B

Sample wt/vol: 30.8 (g/mL) G Lab File ID: 30928S07

Level: (low/med) LOW Date Received: 09/14/93

% Moisture: 3 decanted: (Y/N) N Date Extracted: 09/16/93

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 09/28/93

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 9.4

Number TICs found: 4

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

| CAS NUMBER | COMPOUND NAME | RT | EST. CONC. | Q |
|---|---|---|---|---|
| ~~1. 123-42-2~~ | ~~4-HYDROXY-4-METHYL-2-PENTANO~~ | ~~6.32~~ | ~~78000~~ | ~~BAJ~~ |
| 2. | UNKNOWN HYDROCARBON | 6.87 | 67 | ~~J~~ |
| 3. | UNKNOWN HYDROCARBON | 7.45 | 1100 | ~~J~~ |
| 4. | HEXANEDIOIC ACID ESTER ISOME | 26.23 | 340 | ~~J~~ |

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018

FORM I SV-TIC

3/90

ATTACHMENT 4

LABORATORY NARRATIVE AND CHAIN-OF-CUSTODY DOCUMENTATION

944 3225-1680

# CASE NARRATIVE

LABORATORY : TMA/ARLI

CASE : 09-028

CONTRACT ID : WESTINGHOUSE HANFORD COMPANY

SDG RECEIPT DATE : September 14, 1993

## 1.0 DESCRIPTION OF CASE :

Four soil samples were analyzed for TCL Organics- Volatiles and Semivolatiles according to the USEPA Contract Laboratory Program (CLP) Statement of Work for Organic Analysis, Revision OLM01.8. The Extractable Hydrocarbons in the Kerosene Range (K) were analyzed according to the SW-846 Method 8015M.

## 2.0 SAMPLE LIST :

| WESTINGHOUSE ID | LAB ID | ANALYSIS REQUESTED | MATRIX |
|---|---|---|---|
| B09332 | A3-09-028-01A | V | SOIL |
| B09332 MS | A3-09-028-01B | V | SOIL |
| B09332 MSD | A3-09-028-01C | V | SOIL |
| B09332 | A3-09-028-01D | SV | SOIL |
| B09332 | A3-09-028-01G | K | SOIL |
| B09333 | A3-09-028-02A | V | SOIL |
| B09333 | A3-09-028-02B | SV | SOIL |
| B09333 MS | A3-09-028-02C | SV | SOIL |
| B09333 MSD | A3-09-028-02D | SV | SOIL |
| B09333 | A3-09-028-02G | K | SOIL |
| B09336 | A3-09-028-03A | V | SOIL |
| B09336 | A3-09-028-03B | SV | SOIL |
| B09336 | A3-09-028-03D | K | SOIL |
| B09336 MS | A3-09-028-03E | K | SOIL |
| B09336 MSD | A3-09-028-03F | K | SOIL |
| B09335 | A3-09-028-04A | V | SOIL |

## 3.0 COMMENTS :

### 3.1 SHIPPING AND DOCUMENTATION :

All of the samples were received intact and properly documented.

### 3.2 ANALYSIS

#### 3.2.1 VOLATILE ANALYSIS COMMENTS :

LOW LEVEL SOIL :

The samples were analyzed by heated purge within the CLP SOW holding times.

9413225.1681

All of the QC results were within the limits specified by the EPA CLP SOW.

TUNES :

All BFB tunes were injected directly into the GC/MS instrument.

3.2.2 SEMIVOLATILE ANALYSIS COMMENTS :

LOW LEVEL SOIL :

The samples were extracted and analyzed within the CLP SOW holding times. Phenol was detected in sample B09336 at a concentration that was below the CRQL.

The matrix spike recovery of 2,4-Dinitrotoluene in sample B09333MS was slightly above the QC limits. In accordance with the protocol, no further action was required.

All of the other QC results were within the limits specified by the EPA CLP SOW.

9413225.1682

3.2.3 EXTRACTABLE HYDROCARBONS "KEROSENE RANGE" COMMENTS :

SEQUENCE NOTES :

The sequence was started on 09/16/93 and was analyzed according to the SW-846 Method 8015M. The initial calibration consisted of 5 different levels of the Kerosene standard that ranged from 200ppm to 2000ppm. The continuing calibration at the 1000ppm level was injected amongst a series of samples, in order to verify the instrument stability. The %RSD in the initial calibration and the %D in the continuing calibration were below their 20% and 15% limits, respectively.

SAMPLE NOTES :

LOW LEVEL SOIL :

The samples were extracted and analyzed for extractable hydrocarbons in the Kerosene range within the required holding times. Approximately 10 g of each sample was extracted and concentrated to 5 mL.

There were no hydrocarbons detected in any of the samples. Sample B09336 was spiked with Kerosene and the matrix spike recoveries were 85% and 93%. A blank spike was prepared at the same time, and had an 79% recovery.

All of the QC results were within the limits specified by the SW-846 Method 8015M.

We certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data in this hardcopy data package and in the computer-readable data submitted on diskette is authorized by the Laboratory Manager or his designee, as verified by the following signatures.

Nicole Roth 11/29/93
Nicole Roth
CLP Program Manager

Maureen Parrish 11/29/93
Maureen Parrish
Project Manager

94 4225 1683

Westinghouse Hanford Company

# CHAIN OF CUSTODY

Custody Form Initiator: L E ROGERS

Company Contact: L E ROGERS

Telephone: 376-7690

Project Designation/Sampling Locations: 200-UP-2

Collection Date: 9-9-93

Ice Chest No.: SML 366

Field Logbook No.: EFL-1091

Bill of Lading/Airbill No.:

Offsite Property No.:

Method of Shipment: OVERNIGHT AIR SERVICE

Shipped to: TMA

Possible Sample Hazards/Remarks: Keep samples at 4C (SOIL) NONE DETECTABLE

**Sample Identification**

1) B09332

1,250ml P:CLP;TAL Metals,Hg,Ti
~~1,250ml~~ Gs:VOA CLP
1,250ml nG:Semi-VOA CLP
1,125ml G:Anions F,Cl,SO4 (EPA 300.0)
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,125ml G:Cyanide CLP
1,125ml Gw:Kerosene (8015M)
1,1000ml P/G:Gross alpha/beta (EP-10), Gamma Spec to include,Cs-134,Cs-137,Co-60,Eu-152, Eu-154,Eu-155,K-40,Ru-106,Na-22 (RC-30), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5) Np-237,(RC-101A, RC-622, EP-5) Pu-238,Pu-239/240 (EP-80, EP-81, EP-5) I-129 (RC-25, RC-605) Sr-90 (RC-306, RC-303, RC-309, RC-304) Tc-99 (RC-24, RC-604) Am-241,Cm-244 (EP-80, EP-90, EP-91, EP-92, EP-93, EP-5) Se-79

120ml
9-10-93

2) ~~B09334~~ B09335

~~1,250ml P:CLP;TAL Metals,Hg,Ti~~
120ml ~~1,250ml~~ Gs:VOA CLP
~~1,250ml nG:Semi-VOA CLP~~
~~1,125ml G:Anions F,Cl,SO4 (EPA 300.0)~~
~~1,125ml P/G:Anions NO2,NO3 (EPA 353.2)~~
~~1,125ml G:Cyanide CLP~~
~~1,125ml Gw:Kerosene (8015M)~~
~~1,1000ml P/G:Gross alpha/beta (EP-10), Gamma Spec to include,Cs-134,Cs-137,Co-60,Eu-152, Eu-154,Eu-155,K-40,Ru-106,Na-22 (RC-30), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5) Np-237,(RC-101A, RC-622, EP-5) Pu-238,Pu-239/240 (EP-80, EP-81, EP-5) I-129 (RC-25, RC-605) Sr-90 (RC-306, RC-303, RC-309, RC-304) Tc-99 (RC-24, RC-604) Am-241,Cm-244 (EP-80, EP-90, EP-91, EP-92, EP-93, EP-5) Se-79~~

9-10-93

3)

1,250ml P:CLP;TAL Metals,Hg,Ti
~~1,250ml Gs:VOA CLP~~
1,250ml nG:Semi-VOA CLP
1,125ml G:Anions F,Cl,SO4 (EPA 300.0)
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,125ml G:Cyanide CLP
1,125ml Gw:Kerosene (8015M)
1,1000ml P/G:Gross alpha/beta (EP-10), Gamma Spec to include,Cs-134,Cs-137,Co-60,Eu-152, Eu-154,Eu-155,K-40,Ru-106,Na-22 (RC-30), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5) Np-237,(RC-101A, RC-622, EP-5) Pu-238,Pu-239/240 (EP-80, EP-81, EP-5) I-129 (RC-25, RC-605) Sr-90 (RC-306, RC-303, RC-309, RC-304) Tc-99 (RC-24, RC-604) Am-241,Cm-244 (EP-80, EP-90, EP-91, EP-92, EP-93, EP-5) Se-79

[] Field Transfer of Custody

| Chain of Possession (Sign and Print Names) | | |
|---|---|---|
| Relinquished by: 1040 Jean E. Rogers 9-10-93 | Received by: Roy T. Sieve | Date/Time: 1040 9-10-93 |
| Relinquished by: Roy T. Sieve 1054 9-10-93 | Received by: H. Narciso | Date/Time: 9-10-93 10:50 |
| Relinquished by: | Received by: | Date/Time: |
| Relinquished by: | Received by: | Date/Time: |

**Final Sample Disposition**

| Disposal Method: | Disposed by: | Date/Time: |
|---|---|---|

Comments:

A-6000-407 (12/90) (EF) WEF061
Chain of Custody

Westinghouse Hanford Company

# CHAIN OF CUSTODY

Custody Form Initiator: L E ROGERS

Company Contact: L E ROGERS

Telephone: 376-7690

Project Designation/Sampling Locations: 200-UP-2

Collection Date: 9-10-93

Ice Chest No.: SML 366

Field Logbook No.: EFL-1091

Bill of Lading/Airbill No.:

Offsite Property No.:

Method of Shipment: OVERNIGHT AIR SERVICE

Shipped to: TMA

Possible Sample Hazards/Remarks: Keep samples at 4C (SOIL) NONE DETECTED

**Sample Identification**

1) B09333

1,250ml P:CLP;TAL Metals,Hg,Ti
1,250ml Gs:VOA CLP
1,250ml nG:Semi-VOA CLP
1,125ml G:Anions F,Cl,SO4 (EPA 300.0)
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,125ml G:Cyanide CLP
1,125ml Gw:Kerosene (8015M)
1,1000ml P/G:Gross alpha/beta (EP-10), Gamma Spec to include,Cs-134,Cs-137,Co-60,Eu-152, Eu-154,Eu-155,K-40,Ru-106,Na-22 (RC-30), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5) Np-237,(RC-101A, RC-622, EP-5) Pu-238,Pu-239/240 (EP-80, EP-81, EP-5) I-129 (RC-25, RC-605) Sr-90 (RC-306, RC-303, RC-309, RC-304) Tc-99 (RC-24, RC-604) Am-241,Cm-244 (EP-80, EP-90, EP-91, EP-92, EP-93, EP-5) Se-79

2) B09336

1,250ml P:CLP;TAL Metals,Hg,Ti
~~1,250ml~~ 100ml Gs:VOA CLP
1,250ml aG:Semi-VOA CLP
1,125ml G:Anions F,Cl,SO4 (EPA 300.0)
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,125ml G:Cyanide CLP
1,125ml Gw:Kerosene (8015M)
1,1000ml P/G:Gross alpha/beta (EP-10), Gamma Spec to include,Cs-134,Cs-137,Co-60,Eu-152, Eu-154,Eu-155,K-40,Ru-106,Na-22 (RC-30), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5) Np-237,(RC-101A, RC-622, EP-5) Pu-238,Pu-239/240 (EP-80, EP-81, EP-5) I-129 (RC-25, RC-605) Sr-90 (RC-306, RC-303, RC-309, RC-304) Tc-99 (RC-24, RC-604) Am-241,Cm-244 (EP-80, EP-90, EP-91, EP-92, EP-93, EP-5) Se-79

JER 9-10-93

3)

1,250ml P:CLP;TAL Metals,Hg,Ti
1,250ml Gs:VOA CLP
1,250ml aG:Semi-VOA CLP
1,125ml G:Anions F,Cl,SO4 (EPA 300.0)
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,125ml G:Cyanide CLP
1,125ml Gw:Kerosene (8015M)
1,1000ml P/G:Gross alpha/beta (EP-10), Gamma Spec to include,Cs-134,Cs-137,Co-60,Eu-152, Eu-154,Eu-155,K-40,Ru-106,Na-22 (RC-30), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5) Np-237,(RC-101A, RC-622, EP-5) Pu-238,Pu-239/240 (EP-80, EP-81, EP-5) I-129 (RC-25, RC-605) Sr-90 (RC-306, RC-303, RC-309, RC-304) Tc-99 (RC-24, RC-604) Am-241,Cm-244 (EP-80, EP-90, EP-91, EP-92, EP-93, EP-5) Se-79

JER 9-10-93

[] Field Transfer of Custody — Chain of Possession (Sign and Print Names)

| Relinquished by: | Received by: | Date/Time: |
|---|---|---|
| 1040 L E Rogers 9-10-93 | Roy T Sickle | 9-10-93 1040 |
| Relinquished by: Roy T Sickle 1054 9-10-93 | Received by: A. Yabacis | Date/Time: 9-14-93 10:50 |
| Relinquished by: | Received by: | Date/Time: |
| Relinquished by: | Received by: | Date/Time: |

**Final Sample Disposition**

| Disposal Method: | Disposed by: | Date/Time: |
|---|---|---|

Comments:

A-6000-407 (12/90) (ET) WET061
Chain of Custody

ATTACHMENT 5

DATA VALIDATION SUPPORTING DOCUMENTATION

9W3225.1686

# GC/MS ORGANIC DATA VALIDATION CHECKLIST

| VALIDATION LEVEL: | A | B | C | D | E |
|---|---|---|---|---|---|

| | | |
|---|---|---|
| PROJECT: 200-UP-2 | | DATA PACKAGE: B09332-TMA-611 |
| VALIDATOR: [illegible] | LAB: TMA | DATE: 03/03/94 |
| CASE: | | SDG: B09332-TMA-611 |

ANALYSES PERFORMED

| ☐ CLP Volatiles | ☐ SW-846 8240 (cap column) | ☐ SW-846 8260 (packed column) | ☑ CLP Semivolatiles | ☐ SW-846 8270 (cap column) | ☐ SW-846 (packed column) |
|---|---|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

| SAMPLES/MATRIX Soils |
|---|
| B09332 |
| B09333 |
| B09336 |
| |
| |

9413225.1687

## 1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

Is technical verification documentation present? . . . . . (Yes) No N/A

Is a case narrative present? . . . . . (Yes) No N/A

Comments: _____

## 2. HOLDING TIMES

Are sample holding times acceptable? . . . . . (Yes) No N/A

Comments: _____

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GC/MS ORGANIC DATA VALIDATION CHECKLIST

3. INSTRUMENT TUNING AND CALIBRATION

Is the GC/MS tuning/performance check acceptable? . . . . . Yes No N/A

Are initial calibrations acceptable? . . . . . Yes No N/A

Are continuing calibrations acceptable? . . . . . Yes No N/A

Comments: See comments 1 and 2 on last page of checklist

4. BLANKS

Were laboratory blanks analyzed? . . . . . Yes No N/A

Are laboratory blank results acceptable? . . . . . Yes No N/A

Were field/trip blanks analyzed? . . . . . Yes No N/A

Are field/trip blank results acceptable? . . . . . Yes No N/A

Comments: Di-n-butylphthalate, bis(2-ethylhexyl) phthalate, and phenol are present in the laboratory blank. See attachments for blank concentrations. Phenol was present. The calculation for phenol conc. is included on the attached quant form.

5. ACCURACY

Were surrogates/System Monitoring Compounds analyzed? . . . . . Yes No N/A

Are surrogate/System Monitoring Compound recoveries acceptable? Yes No N/A

Were MS/MSD samples analyzed? . . . . . Yes No N/A

Are MS/MSD results acceptable? . . . . . Yes No N/A

Comments: The MS&R for 2,4-Dinitrotoluene is 0.32, the control limits are 32-98%. However, no qual flag is required since all surrogates are within limits and the 2,4-dinitrotoluene MS&R is close to 100%, which is ideal.



-027

9413225.1688

GC/MS ORGANIC DATA VALIDATION CHECKLIST

6. PRECISION

Are MS/MSD RPD values acceptable? . . . . . Yes No N/A

Are field duplicate RPD values acceptable? . . . . . Yes No N/A

Are field split RPD values acceptable? . . . . . Yes No N/A

Comments:

7. SYSTEM PERFORMANCE

Were internal standards analyzed? . . . . . Yes No N/A

Are internal standard areas acceptable? . . . . . Yes No N/A

Are internal standard retention times acceptable? . . . . . Yes No N/A

Comments:

8. COMPOUND IDENTIFICATION AND QUANTITATION

Is compound identification acceptable? . . . . . Yes No N/A

Is compound quantitation acceptable? . . . . . Yes No N/A

Comments:

9. REPORTED RESULTS AND QUANTITATION LIMITS

Are results reported for all requested analyses? . . . . . Yes No N/A

Are all results supported in the raw data? . . . . . Yes No N/A

Do results meet the CRQLs? . . . . . Yes No N/A

Has the laboratory properly identified and coded all TIC? . . . Yes No N/A

Comments:

9413225.1689

GC/MS ORGANIC DATA VALIDATION CHECKLIST

Comments (attach additional sheets as necessary):

(1) The minimum RRF for surrogate 1,2-dichlorobenzene-d4 is 0.400 according to the SOW, the laboratory has recorded 0.800 on the calibration. No qualification is required.

(2) The laboratory used 20 ng/ul of internal standard instead of the specified amount of 40 ng/ul. No qualification is required, however, a factor of 2 is included in the result calculations.

9413225.1690

# HOLDING TIME SUMMARY

B0933D TMA-611

| SDG: | VALIDATOR: | DATE: 2/3/94 | PAGE 1 OF 1 |
|---|---|---|---|
| COMMENTS: Semivolatile Organics | | | |

| FIELD SAMPLE ID | ANALYSIS TYPE | DATE SAMPLED | DATE PREPARED | DATE ANALYZED | PREP. HOLDING TIME, DAYS | ANALYSIS HOLDING TIME, DAYS | QUALIFIER |
|---|---|---|---|---|---|---|---|
| B0933D | BNA | 9/09/93 | 9/16/93 | 9/28/93 | 7 | 12 | None |
| B0933 | | 9/10/93 | | 9/28/93 | 6 | 12 | |
| B0936 | | 9/10/93 | | 9/28/93 | 6 | 12 | |

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

SBLK0916S

Lab Name: TMA/ARLI Contract: WHC

Lab Code: TMALA Case No.: 09028 SAS No.: NA SDG No.: NA

Matrix: (soil/water) SOIL Lab Sample ID: A309028-BLK

Sample wt/vol: 30.4 (g/mL) G Lab File ID: 30928S02

Level: (low/med) LOW Date Received: _____

% Moisture: _____ decanted: (Y/N) N Date Extracted: 09/16/93

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 09/28/93

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: ____

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

| CAS NO. | COMPOUND | | Q |
|---|---|---|---|
| 108-95-2 | Phenol | 15 ~~330~~ | ~~U~~ |
| 111-44-4 | bis(2-Chloroethyl)Ether | 330 | U |
| 95-57-8 | 2-Chlorophenol | 330 | U |
| 541-73-1 | 1,3-Dichlorobenzene | 330 | U |
| 106-46-7 | 1,4-Dichlorobenzene | 330 | U |
| 95-50-1 | 1,2-Dichlorobenzene | 330 | U |
| 95-48-7 | 2-Methylphenol | 330 | U |
| 108-60-1 | 2,2'-oxybis(1-Chloropropane) | 330 | U |
| 106-44-5 | 4-Methylphenol | 330 | U |
| 621-64-7 | N-Nitroso-Di-n-Propylamine | 330 | U |
| 67-72-1 | Hexachloroethane | 330 | U |
| 98-95-3 | Nitrobenzene | 330 | U |
| 78-59-1 | Isophorone | 330 | U |
| 88-75-5 | 2-Nitrophenol | 330 | U |
| 105-67-9 | 2,4-Dimethylphenol | 330 | U |
| 111-91-1 | bis(2-Chloroethoxy)Methane | 330 | U |
| 120-83-2 | 2,4-Dichlorophenol | 330 | U |
| 120-82-1 | 1,2,4-Trichlorobenzene | 330 | U |
| 91-20-3 | Naphthalene | 330 | U |
| 106-47-8 | 4-Chloroaniline | 330 | U |
| 87-68-3 | Hexachlorobutadiene | 330 | U |
| 59-50-7 | 4-Chloro-3-Methylphenol | 330 | U |
| 91-57-6 | 2-Methylnaphthalene | 330 | U |
| 77-47-4 | Hexachlorocyclopentadiene | 330 | U |
| 88-06-2 | 2,4,6-Trichlorophenol | 330 | U |
| 95-95-4 | 2,4,5-Trichlorophenol | 790 | U |
| 91-58-7 | 2-Chloronaphthalene | 330 | U |
| 88-74-4 | 2-Nitroaniline | 790 | U |
| 131-11-3 | Dimethylphthalate | 330 | U |
| 208-96-8 | Acenaphthylene | 330 | U |
| 99-09-2 | 3-Nitroaniline | 790 | U |
| 83-32-9 | Acenaphthene | 330 | U |
| 51-28-5 | 2,4-Dinitrophenol | 790 | U |

FORM I SV-1



3/3/94

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

SBLK0916S

Lab Name: TMA/ARLI Contract: WHC

Lab Code: TMALA Case No.: 09028 SAS No.: NA SDG No.: NA

Matrix: (soil/water) SOIL Lab Sample ID: A309028-BLK

Sample wt/vol: 30.4 (g/mL) G Lab File ID: 30928S02

Level: (low/med) LOW Date Received: _____

% Moisture: _____ decanted: (Y/N) N Date Extracted: 09/16/93

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 09/28/93

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: _____

9413225.1693

| CAS NO. | COMPOUND | CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG | Q |
|---|---|---|---|
| 100-02-7 | 4-Nitrophenol | 790 | U |
| 132-64-9 | Dibenzofuran | 330 | U |
| 121-14-2 | 2,4-Dinitrotoluene | 330 | U |
| 606-20-2 | 2,6-Dinitrotoluene | 330 | U |
| 84-66-2 | Diethylphthalate | 330 | U |
| 7005-72-3 | 4-Chlorophenyl-phenylether | 330 | U |
| 86-73-7 | Fluorene | 330 | U |
| 100-01-6 | 4-Nitroaniline | 790 | U |
| 534-52-1 | 4,6-Dinitro-2-methylphenol | 790 | U |
| 86-30-6 | N-Nitrosodiphenylamine (1) | 330 | U |
| 101-55-3 | 4-Bromophenyl-phenylether | 330 | U |
| 118-74-1 | Hexachlorobenzene | 330 | U |
| 87-86-5 | Pentachlorophenol | 790 | U |
| 85-01-8 | Phenanthrene | 330 | U |
| 120-12-7 | Anthracene | 330 | U |
| 86-74-8 | Carbazole | 330 | U |
| 84-74-2 | Di-n-Butylphthalate | 260 | J |
| 206-44-0 | Fluoranthene | 330 | U |
| 129-00-0 | Pyrene | 330 | U |
| 85-68-7 | Butylbenzylphthalate | 330 | U |
| 91-94-1 | 3,3'-Dichlorobenzidine | 330 | U |
| 56-55-3 | Benzo(a)Anthracene | 330 | U |
| 117-81-7 | bis(2-Ethylhexyl)Phthalate | 420 | |
| 218-01-9 | Chrysene | 330 | U |
| 117-84-0 | Di-n-Octyl Phthalate | 330 | U |
| 205-99-2 | Benzo(b)Fluoranthene | 330 | U |
| 207-08-9 | Benzo(k)Fluoranthene | 330 | U |
| 50-32-8 | Benzo(a)Pyrene | 330 | U |
| 193-39-5 | Indeno(1,2,3-cd)Pyrene | 330 | U |
| 53-70-3 | Dibenz(a,h)Anthracene | 330 | U |
| 191-24-2 | Benzo(g,h,i)Perylene | 330 | U |

(1) - Cannot be separated from Diphenylamine

FORM I SV-2

-032 3/3/94

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

SBLK0916S

Lab Name: TMA/ARLI Contract: WHC

Lab Code: TMALA Case No.: 09028 SAS No.: NA SDG No.: NA

Matrix: (soil/water) SOIL Lab Sample ID: A309028-BLK

Sample wt/vol: 30.4 (g/mL) G Lab File ID: 30928S02

Level: (low/med) LOW Date Received: _____

% Moisture: _____ decanted: (Y/N) N Date Extracted: 09/16/93

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 09/28/93

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: _____

Number TICs found: 2

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

| CAS NUMBER | COMPOUND NAME | RT | EST. CONC. | Q |
|---|---|---|---|---|
| ~~1. 123-42-2~~ | ~~4-HYDROXY-4-METHYL-2-PENTANO~~ | ~~6.32~~ | ~~75000~~ | ~~AJ~~ R |
| 2. | UNKNOWN HYDROCARBON | 6.35 | 66 | J XS=33 |

3/3/94

FORM I SV-TIC 3/90

Lab. Blank

~~000325~~

Quantitation Report File: 30928S02

SBLK0916S

Data: 30928S02.TI
09/28/93 11:32:00
Sample: CLP,09028,,SBLK0916S,L,S,A309028-BLK,BNA,BLANK
Conds.: CAP/.25,30928S01,3DFT0928S01
Formula: 30920SAVG90 Instrument: SHERMA Weight: 0.000
Submitted by: 30G:0.5M Analyst: FH#33S Acct. No.: CALTAB

AMOUNT=AREA * REF AMNT/(REF AREA * RESP FACT)
Resp. fac. from Library Entry

| No | Name | |
|---|---|---|
| 1 | CI30 | *IS1* 1,4-DICHLOROBENZENE-D4 |
| 2 | CI40 | *IS2* NAPHTHALENE-D8 |
| 3 | CI50 | *IS3* ACENAPHTHENE-D10 |
| 4 | CI60 | *IS4* PHENANTHRENE-D10 |
| 5 | CI70 | *IS5* CHRYSENE-D12 |
| 6 | CI75 | *IS6* PERYLENE-D12 |
| 7 | CS50 | *SU1* 2-FLUOROPHENOL |
| 8 | CS45 | *SU2* PHENOL-D5 |
| 9 | CS55 | *SU3* 2,4,6,-TRIBROMOPHENOL |
| 10 | CS20 | *SU4* NITROBENZENE-D5 |
| 11 | CS25 | *SU5* 2-FLUOROBIPHENYL |
| 12 | CS30 | *SU6* TERPHENYL-D14 |
| 13 | CS70 | 2-CHLOROPHENOL-D4 |
| 14 | CS75 | 1,2-DICHLOROBENZENE-D4 |
| 15 | C315 | PHENOL |
| 16 | C325 | BIS(2-CHLOROETHYL)ETHER |
| 17 | C330 | 2-CHLOROPHENOL |
| 18 | C335 | 1,3-DICHLOROBENZENE |
| 19 | C340 | 1,4-DICHLOROBENZENE |
| 20 | C345 | BENZYL ALCOHOL |
| 21 | C350 | 1,2-DICHLOROBENZENE |
| 22 | C355 | 2-METHYLPHENOL |
| 23 | C360 | BIS(2-CHLOROISOPROPYL)ETHER |
| 24 | C365 | 4-METHYLPHENOL |
| 25 | C370 | N-NITROSO-DI-N-PROPYLAMINE |
| 26 | C375 | HEXACHLOROETHANE |
| 27 | C410 | NITROBENZENE |
| 28 | C415 | ISOPHORONE |
| 29 | C420 | 2-NITROPHENOL |
| 30 | C425 | 2,4-DIMETHYLPHENOL |
| 31 | C435 | BIS(2-CHLOROETHOXY)METHANE |
| 32 | C430 | BENZOIC ACID |
| 33 | C440 | 2,4-DICHLOROPHENOL |
| 34 | C445 | 1,2,4-TRICHLOROBENZENE |
| 35 | C450 | NAPHTHALENE |
| 36 | C455 | 4-CHLOROANILINE |
| 37 | C460 | HEXACHLOROBUTADIENE |
| 38 | C465 | 4-CHLORO-3-METHYLPHENOL |
| 39 | C470 | 2-METHYLNAPHTHALENE |
| 40 | C510 | HEXACHLOROCYCLOPENTADIENE |
| 41 | C515 | 2,4,6-TRICHLOROPHENOL |
| 42 | C520 | 2,4,5-TRICHLOROPHENOL |
| 43 | C525 | 2-CHLORONAPHTHALENE |
| 44 | C530 | 2-NITROANILINE |
| 45 | C535 | DIMETHYL PHTHALATE |
| 46 | C540 | ACENAPHTHYLENE |
| 47 | C545 | 3-NITROANILINE |

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3/3/94

Lab. Blank
SBLK0916S

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| No | Name | |
|---|---|---|
| 48 | C550 | ACENAPHTHENE |
| 49 | C555 | 2,4-DINITROPHENOL |
| 50 | C560 | 4-NITROPHENOL |

F.H. 9/28/9

| No | m/z | Scan | Time | Ref | RRT | Meth | Area(Hght) | Amount | | %Tot |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 152 | 739 | 9:20 | 1 | 1.000 | A BB | 31902. | 20.000 | NG/UL | 3.20 |
| 2 | 136 | 982 | 12:24 | 2 | 1.000 | A BB | 118660. | 20.000 | NG/UL | 3.20 |
| 3 | 164 | 1343 | 16:57 | 3 | 1.000 | A BB | 64368. | 20.000 | NG/UL | 3.20 |
| 4 | 188 | 1648 | 20:48 | 4 | 1.000 | A BV | 89210. | 20.000 | NG/UL | 3.20 |
| 5 | 240 | 2177 | 27:29 | 5 | 1.000 | A BB | 59878. | 20.000 | NG/UL | 3.20 |
| 6 | 264 | 2595 | 32:46 | 6 | 1.000 | A BB | 33815. | 20.000 | NG/UL | 3.20 |
| 7 | 112 | 526 | 6:38 | 1 | 0.712 | A BB | 138638. | 73.271 | NG/UL | 11.72 |
| 8 | 99 | 674 | 8:31 | 1 | 0.912 | A BB | 176198. | 71.451 | NG/UL | 11.43 |
| 9 | 330 | 1506 | 19:01 | 3 | 1.121 | A BB | 30518. | 64.871 | NG/UL | 10.38 |
| 10 | 82 | 843 | 10:39 | 2 | 0.858 | A BB | 119966. | 46.995 | NG/UL | 7.52 |
| 11 | 172 | 1204 | 15:12 | 3 | 0.897 | A BB | 163804. | 48.219 | NG/UL | 7.71 |
| 12 | 244 | 1967 | 24:50 | 5 | 0.904 | A BB | 147059. | 53.202 | NG/UL | 8.51 |
| 13 | 132 | 699 | 8:49 | 1 | 0.946 | A BB | 136248. | 72.544 | NG/UL | 11.60 |
| 14 | 152 | 767 | 9:41 | 1 | 1.038 | A BB | 61326. | 47.666 | NG/UL | 7.62 |
| ~~15~~ | ~~94~~ | ~~676~~ | ~~8:32~~ | ~~1~~ | ~~0.915~~ | ~~A BB~~ | ~~1110.~~ | ~~0.450~~ | ~~NG/UL~~ | ~~0.07~~ |
| 16 | NOT FOUND | | | | | | | | | |
| 17 | NOT FOUND | | | | | | | | | |
| 18 | NOT FOUND | | | | | | | | | |
| 19 | NOT FOUND | | | | | | | | | |
| ~~20~~ | ~~108~~ | ~~767~~ | ~~9:41~~ | ~~1~~ | ~~1.038~~ | ~~A BB~~ | ~~558.~~ | ~~0.341~~ | ~~NG/UL~~ | ~~0.09~~ |
| 21 | NOT FOUND | | | | | | | | | |
| 22 | NOT FOUND | | | | | | | | | |
| 23 | NOT FOUND | | | | | | | | | |
| 24 | NOT FOUND | | | | | | | | | |
| 25 | NOT FOUND | | | | | | | | | |
| 26 | NOT FOUND | | | | | | | | | |
| 27 | NOT FOUND | | | | | | | | | |
| 28 | NOT FOUND | | | | | | | | | |
| 29 | NOT FOUND | | | | | | | | | |
| 30 | NOT FOUND | | | | | | | | | |
| 31 | NOT FOUND | | | | | | | | | |
| 32 | NOT FOUND | | | | | | | | | |
| 33 | NOT FOUND | | | | | | | | | |
| 34 | NOT FOUND | | | | | | | | | |
| ~~35~~ | ~~128~~ | ~~986~~ | ~~12:27~~ | ~~2~~ | ~~1.304~~ | ~~A BB~~ | ~~552.~~ | ~~0.112~~ | ~~NG/UL~~ | ~~0.02~~ |
| 36 | NOT FOUND | | | | | | | | | |
| 37 | NOT FOUND | | | | | | | | | |
| 38 | NOT FOUND | | | | | | | | | |
| 39 | NOT FOUND | | | | | | | | | |
| 40 | NOT FOUND | | | | | | | | | |
| 41 | NOT FOUND | | | | | | | | | |
| 42 | NOT FOUND | | | | | | | | | |
| 43 | NOT FOUND | | | | | | | | | |
| 44 | NOT FOUND | | | | | | | | | |
| 45 | NOT FOUND | | | | | | | | | |
| 46 | NOT FOUND | | | | | | | | | |
| 47 | NOT FOUND | | | | | | | | | |
| 48 | NOT FOUND | | | | | | | | | |
| 49 | NOT FOUND | | | | | | | | | |
| 50 | NOT FOUND | | | | | | | | | |

for CPC — for internal std. dilin

$$\text{ug/kg phenol} = \frac{(1110)(20)(500)(2)(2)}{(31902)(1.548)(30.4)(2)}$$

ug/kg phenol = 14.8 = 15 ug/kg in Blank

15 ug/kg × 5 = 75 ug/kg — upper limit

9413225-1696

07/29/93



3/3/94

SEMIVOLATILE ORGANIC DATA VALIDATION SUMMARY FOR DATA PACKAGE:
B09332-TMA-611 (923-E418, Filename B09332.BNA)

9413225.1697

COPY

MEMORANDUM

RECORD COPY

TO: 200-UP-2 Project QA Record April 20, 1994

FR: Susan Winter, Golder Associates Inc.

RE: SEMIVOLATILE ORGANIC DATA VALIDATION SUMMARY FOR DATA PACKAGE: B09332-TMA-611 (923-E418, Filename B09332.BNA)

## INTRODUCTION

This memo presents the results of data validation on data package B09332-TMA-611 prepared by the Thermo Analytical (TMA) laboratory. A list of samples validated along with the analyses reported and the method of analysis is provided in the following table.

| SAMPLE ID | SAMPLE DATE | MEDIA | ANALYSIS |
|---|---|---|---|
| B09332<br>B09333<br>B09336 | 09/09/93<br>09/10/93<br>09/10/93 | SOIL<br>SOIL<br>SOIL | SEE NOTE 1 |
| Note 1. All samples were analyzed for CLP TCL Semivolatile Organic Constituents. | | | |

Data validation was conducted in accordance with the WHC statement of work (WHC 1993a) and validation procedures (WHC 1993b). Attachments 1 through 5 provide the following information as indicated below:

Attachment 1. Glossary of Data Reporting Qualifiers
Attachment 2. Summary of Data Qualifications
Attachment 3. Qualified Data Summary and Annotated Laboratory Reports
Attachment 4. Laboratory Narrative and Chain-of-Custody Documentation
Attachment 5. Data Validation Supporting Documentation

## DATA QUALITY OBJECTIVES

This section presents a summary of the data quality in terms of the referenced validation criteria.

**Precision.** Goals for precision were met.

**Accuracy.** Goals for accuracy were met.

**Sample Result Verification.** All sample results were supported in the raw data.

**Detection Limits.** Detection limit goals were met for all sample results as specified in the reference analytical method.

**Completeness.** The data package was complete for all requested analyses. A total of three samples were validated in this data package with a total of 192 determinations reported, all of

Revised 4/26/94



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which were deemed valid. This results in a completeness of 100 percent, which meets normal work plan objectives of 90%.

## MAJOR DEFICIENCIES

The following major deficiencies were identified during data validation which required qualification of data as unusable.

- The tentatively identified compound (TIC) identified as 4-hydroxy-4-methyl-2-pentanone has been qualified as unusable (UR) since it is an aldol condensation product, a suspected laboratory contaminant. Attachments 2 and 5 provide a summary of the samples affected, data qualifications applied and supporting documentation. However, these qualifications do not affect the percent completeness since the TICs are not TCL compounds.

## MINOR DEFICIENCIES

The following minor deficiencies were identified during data validation which required qualification of data.

Laboratory Blanks

- Di-n-butylphthalate, bis(2-ethylhexyl)phthalate, pyrene, and two TICs, as listed in Attachment 2, were detected in the associated laboratory blank. Attachments 2 and 5 provide a summary of the samples affected, data qualifications applied and supporting documentation.

## REFERENCES

WHC 1993a, Validation of 200-UP-2 Data, Statement of Work, Analytical Laboratory Data Validation, Task Order S-94-18, December 14, 1993, Purchase Order M073750. Westinghouse Hanford Company, Richland, Washington.

WHC 1993b, Data Validation Procedures for Chemical Analyses, WHC-SD-EN-SPP-002, Rev. 2, 1993. Westinghouse Hanford Company, Richland, Washington.

Revised 4/20/94

ATTACHMENT 1

GLOSSARY OF DATA REPORTING QUALIFIERS

9413225.1700

## GLOSSARY OF ORGANIC DATA REPORTING QUALIFIERS

B - Indicates the constituent was analyzed for and detected in the associated laboratory blank. This qualifier is applied by the laboratory. During the process of data validation this qualifier may be replaced by other appropriate qualifiers as defined by the validation procedures. The associated data should be considered usable for decision making purposes.

U - Indicates the constituent was analyzed for and not detected. The concentration reported is the sample quantitation limit corrected for aliquot size, dilution and percent solids (in the case of solid matrices) by the laboratory. The associated data should be considered usable for decision making purposes.

UJ - Indicates the constituent was analyzed for and not detected. Due to a minor quality control deficiency identified during data validation the concentration reported may not accurately reflect the sample quantitation limit. The associated data should be considered usable for decision making purposes.

J - Indicates the constituent was analyzed for and detected. This qualifier may be applied by the laboratory to indicate a concentration which is less than the contract required quantitation limit (CRQL) but greater than the instrument detection limit (IDL). During data validation this qualifier may be applied to indicate a minor quality control deficiency. However in either case, the associated data should be considered usable for decision making purposes.

NJ - Indicates presumptive evidence of a constituent at an estimated value. This qualifier is normally applied to GC analysis data (such as organochlorine pesticide and PCB data). The associated data should be considered usable for decision making purposes.

N - Indicates presumptive evidence of a constituent. This qualifier is normally applied to GC analysis data (such as organochlorine pesticide and PCB data). The associated data should be considered usable for decision making purposes.

JN - Indicates a tentatively identified compound (TIC) whose concentration and identification have been determined to be valid as a result of data validation. The associated data should be considered usable for decision making purposes.

UJN - Indicates a tentatively identified compound (TIC) that has been determined to be presumptive and valid (JN) in terms of identification and quantitation and has been qualified as undetected (U) due to associated blank contamination.

UR - Indicates the constituent was analyzed for and not detected. The concentration reported has been qualified as unusable due to a major quality control deficiency identified during data validation. The associated data should be considered unusable for decision making purposes.

R - Indicates the constituent was analyzed for and detected. The concentration reported has been qualified as unusable due to a major quality control deficiency identified during data validation. The associated data should be considered unusable for decision making purposes.

OH3225.1701

ATTACHMENT 2

SUMMARY OF DATA QUALIFICATIONS

9W3225.1702

# DATA QUALIFICATION SUMMARY

| SDG: B09332-TMA-611 | VALIDATOR: DATE: March 24, 1994 | | PAGE 1 OF 1 |
|---|---|---|---|
| COMMENTS: SEMIVOLATILE ORGANICS | | | |
| COMPOUND | QUALIFIER | SAMPLES AFFECTED | REASON |
| DI-N-BUTYLPHTHALATE | U | B09332<br>B09333<br>B09336 | PRESENT IN LABORATORY BLANK |
| BIS(2-ETHYLHEXYL)PHTHALATE | U | B09332<br>B09333<br>B09336 | PRESENT IN LABORATORY BLANK |
| PHENOL | U | B09336 | PRESENT IN LABORATORY BLANK |
| 4-HYDROXY-4-METHYL-2-PENTANONE | U | B09332<br>B09333<br>B09336 | PRESENT IN LABORATORY BLANK |
| 4-HYDROXY-4-METHYL-2-PENTANONE | UR | B09332<br>B09333<br>B09336 | SUSPECTED LABORATORY CONTAMINANT (ALDOL CONDENSATE) |
| UNKNOWN HYDROCARBON @ RT 6.85 MINUTES | UJN | B09332<br>B09333 | PRESENT IN BLANK |
| UNKNOWN HYDROCARBON @ RT 6.87 MINUTES | UJN | B09336 | PRESENT IN BLANK |
| UNKNOWN HYDROCARBONS @ RT 7.42 AND 8.73 MINUTES | JN | B09333 | IDENTIFIED AS A VALID RESULT USING DATA VALIDATION PROCEDURES |
| PROPANOIC ACID ESTER ISOMER @ RT 18.1 MINUTES | JN | B09333 | IDENTIFIED AS A VALID RESULT USING DATA VALIDATION PROCEDURES |
| HEXANEDIOIC ACID ESTER ISOMER @ RT 26.22 MINUTES | JN | B09333 | IDENTIFIED AS A VALID RESULT USING DATA VALIDATION PROCEDURES |
| UNKNOWN HYDROCARBON @ RT 7.45 MINUTES | JN | B09336 | IDENTIFIED AS A VALID RESULT USING DATA VALIDATION PROCEDURES |
| HEXANEDIOIC ACID ESTER ISOMER @ RT 26.23 MINUTES | JN | B09336 | IDENTIFIED AS A VALID RESULT USING DATA VALIDATION PROCEDURES |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

9413225.1703

ATTACHMENT 3

QUALIFIED DATA SUMMARY AND ANNOTATED LABORATORY REPORTS

9413225.1704

Validated Data Summary, Data Package: B09332-TMA-611

| | Samp# | B09332 | | B09333 | | B09336 | |
|---|---|---|---|---|---|---|---|
| | Date | 9-9-93 | | 9-10-93 | | 9-10-93 | |
| | Location | 299-W19-95 | | 299-W19-97 | | 299-W19-95 | |
| | Depth | 60.00 - 62.50 | | 50.00 - 52.50 | | 74.80 - 77.30 | |
| | Type | --- | | --- | | --- | |
| | Comments | --- | | --- | | --- | |
| Parameter | Units | Result | Q | Result | Q | Result | Q |
| PHENOL | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| BIS(2-CHLOROETHYL)ETHER | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| 2-CHLOROPHENOL | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| 1,3-DICHLOROBENZENE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| 1,4-DICHLOROBENZENE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| 1,2-DICHLOROBENZENE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| 2-METHYLPHENOL | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| 2,2'-OXYBIS(1-CHLOROPROPANE) | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| 4-METHYLPHENOL | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| N-NITROSO-DI-N-PROPYLAMINE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| HEXACHLOROETHANE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| NITROBENZENE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| ISOPHORONE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| 2-NITROPHENOL | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| 2,4-DIMETHYLPHENOL | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| BIS(2-CHLOROETHOXY)METHANE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| 2,4-DICHLOROPHENOL | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| 1,2,4-TRICHLOROBENZENE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| NAPHTHALENE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| 4-CHLOROANILINE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| HEXACHLOROBUTADIENE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| 4-CHLORO-3-METHYLPHENOL | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| 2-METHYLNAPHTHALENE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| HEXACHLOROCYCLOPENTADIENE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| 2,4,6-TRICHLOROPHENOL | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| 2,4,5-TRICHLOROPHENOL | UG/KG | 840.000 | U | 940.000 | U | 800.000 | U |
| 2-CHLORONAPHTHALENE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| 2-NITROANILINE | UG/KG | 840.000 | U | 940.000 | U | 800.000 | U |
| DIMETHYLPHTHALATE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| ACENAPHTHYLENE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| 3-NITROANILINE | UG/KG | 840.000 | U | 940.000 | U | 800.000 | U |
| ACENAPHTHENE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |

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Validated Data Summary, Data Package: B09332-TMA-611

| | Samp# | B09332 | | B09333 | | B09336 | |
|---|---|---|---|---|---|---|---|
| | Date | 9-9-93 | | 9-10-93 | | 9-10-93 | |
| | Location | 299-W19-95 | | 299-W19-97 | | 299-W19-95 | |
| | Depth | 60.00 - 62.50 | | 50.00 - 52.50 | | 74.80 - 77.30 | |
| | Type | --- | | --- | | --- | |
| | Comments | --- | | --- | | --- | |
| Parameter | Units | Result | Q | Result | Q | Result | Q |
| 2,4-DINITROPHENOL | UG/KG | 840.000 | U | 940.000 | U | 800.000 | U |
| 4-NITROPHENOL | UG/KG | 840.000 | U | 940.000 | U | 800.000 | U |
| DIBENZOFURAN | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| 2,4-DINITROTOLUENE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| 2,6-DINITROTOLUENE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| DIETHYLPHTHALATE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| 4-CHLOROPHENYL-PHENYLETHER | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| FLUORENE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| 4-NITROANILINE | UG/KG | 840.000 | U | 940.000 | U | 800.000 | U |
| 4,6-DINITRO-2-METHYLPHENOL | UG/KG | 840.000 | U | 940.000 | U | 800.000 | U |
| N-NITROSODIPHENYLAMINE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| 4-BROMOPHENYL-PHENYLETHER | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| HEXACHLOROBENZENE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| PENTACHLOROPHENOL | UG/KG | 840.000 | U | 940.000 | U | 800.000 | U |
| PHENANTHRENE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| ANTHRACENE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| CARBAZOLE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| DI-N-BUTYLPHTHALATE | UG/KG | 420.000 | U | 390.000 | U | 330.000 | U |
| FLUORANTHENE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| PYRENE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| BUTYLBENZYLPHTHALATE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| 3,3'-DICHLOROBENZIDINE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| BENZO(A)ANTHRACENE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| BIS(2-ETHYLHEXYL)PHTHALATE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| CHRYSENE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| DI-N-OCTYLPHTHALATE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| BENZO(B)FLUORANTHENE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| BENZO(K)FLUORANTHENE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| BENZO(A)PYRENE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| INDENO(1,2,3-CD)PYRENE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| DIBENZ(A,H)ANTHRACENE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |
| BENZO(G,H,I)PERYLENE | UG/KG | 350.000 | U | 390.000 | U | 330.000 | U |

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1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
299-W19-95
B09332
60-62.5'

Lab Name: TMA/ARLI Contract: WHC

Lab Code: TMALA Case No.: 09028 SAS No.: NA SDG No.: NA

Matrix: (soil/water) SOIL Lab Sample ID: A309028-01D

Sample wt/vol: 30.4 (g/mL) G Lab File ID: 30928S03

Level: (low/med) LOW Date Received: 09/14/93

% Moisture: 6 decanted: (Y/N) N Date Extracted: 09/16/93

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 09/28/93

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 9.4

9413225.1707

| CAS NO. | COMPOUND | CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG | Q |
|---|---|---|---|
| 108-95-2 | Phenol | 350 | U |
| 111-44-4 | bis(2-Chloroethyl)Ether | 350 | U |
| 95-57-8 | 2-Chlorophenol | 350 | U |
| 541-73-1 | 1,3-Dichlorobenzene | 350 | U |
| 106-46-7 | 1,4-Dichlorobenzene | 350 | U |
| 95-50-1 | 1,2-Dichlorobenzene | 350 | U |
| 95-48-7 | 2-Methylphenol | 350 | U |
| 108-60-1 | 2,2'-oxybis(1-Chloropropane) | 350 | U |
| 106-44-5 | 4-Methylphenol | 350 | U |
| 621-64-7 | N-Nitroso-Di-n-Propylamine | 350 | U |
| 67-72-1 | Hexachloroethane | 350 | U |
| 98-95-3 | Nitrobenzene | 350 | U |
| 78-59-1 | Isophorone | 350 | U |
| 88-75-5 | 2-Nitrophenol | 350 | U |
| 105-67-9 | 2,4-Dimethylphenol | 350 | U |
| 111-91-1 | bis(2-Chloroethoxy)Methane | 350 | U |
| 120-83-2 | 2,4-Dichlorophenol | 350 | U |
| 120-82-1 | 1,2,4-Trichlorobenzene | 350 | U |
| 91-20-3 | Naphthalene | 350 | U |
| 106-47-8 | 4-Chloroaniline | 350 | U |
| 87-68-3 | Hexachlorobutadiene | 350 | U |
| 59-50-7 | 4-Chloro-3-Methylphenol | 350 | U |
| 91-57-6 | 2-Methylnaphthalene | 350 | U |
| 77-47-4 | Hexachlorocyclopentadiene | 350 | U |
| 88-06-2 | 2,4,6-Trichlorophenol | 350 | U |
| 95-95-4 | 2,4,5-Trichlorophenol | 840 | U |
| 91-58-7 | 2-Chloronaphthalene | 350 | U |
| 88-74-4 | 2-Nitroaniline | 840 | U |
| 131-11-3 | Dimethylphthalate | 350 | U |
| 208-96-8 | Acenaphthylene | 350 | U |
| 99-09-2 | 3-Nitroaniline | 840 | U |
| 83-32-9 | Acenaphthene | 350 | U |
| 51-28-5 | 2,4-Dinitrophenol | 840 | U |

FORM I SV-1

Ver. S.d

3/3/94

01C

~~000197~~

1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
299-W19-95
B09332
60-62.5'

Lab Name: TMA/ARLI Contract: WHC

Lab Code: TMALA Case No.: 09028 SAS No.: NA SDG No.: NA

Matrix: (soil/water) SOIL Lab Sample ID: A309028-01D

Sample wt/vol: 30.4 (g/mL) G Lab File ID: 30928S03

Level: (low/med) LOW Date Received: 09/14/93

% Moisture: 6 decanted: (Y/N) N Date Extracted: 09/16/93

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 09/28/93

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 9.4

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

| CAS NO. | COMPOUND | | Q | Q |
|---|---|---|---|---|
| 100-02-7 | 4-Nitrophenol | 840 | U | |
| 132-64-9 | Dibenzofuran | 350 | U | |
| 121-14-2 | 2,4-Dinitrotoluene | 350 | U | |
| 606-20-2 | 2,6-Dinitrotoluene | 350 | U | |
| 84-66-2 | Diethylphthalate | 350 | U | |
| 7005-72-3 | 4-Chlorophenyl-phenylether | 350 | U | |
| 86-73-7 | Fluorene | 350 | U | |
| 100-01-6 | 4-Nitroaniline | 840 | U | |
| 534-52-1 | 4,6-Dinitro-2-methylphenol | 840 | U | |
| 86-30-6 | N-Nitrosodiphenylamine (1) | 350 | U | |
| 101-55-3 | 4-Bromophenyl-phenylether | 350 | U | |
| 118-74-1 | Hexachlorobenzene | 350 | U | |
| 87-86-5 | Pentachlorophenol | 840 | U | |
| 85-01-8 | Phenanthrene | 350 | U | |
| 120-12-7 | Anthracene | 350 | U | |
| 86-74-8 | Carbazole | 350 | U | |
| 84-74-2 | Di-n-Butylphthalate | 420 | ~~B~~ | u |
| 206-44-0 | Fluoranthene | 350 | U | |
| 129-00-0 | Pyrene | 350 | U | |
| 85-68-7 | Butylbenzylphthalate | 350 | U | |
| 91-94-1 | 3,3'-Dichlorobenzidine | 350 | U | |
| 56-55-3 | Benzo(a)Anthracene | 350 | U | |
| 117-81-7 | bis(2-Ethylhexyl)Phthalate | 350 ~~56~~ | ~~BJ~~ | u |
| 218-01-9 | Chrysene | 350 | U | |
| 117-84-0 | Di-n-Octyl Phthalate | 350 | U | |
| 205-99-2 | Benzo(b)Fluoranthene | 350 | U | |
| 207-08-9 | Benzo(k)Fluoranthene | 350 | U | |
| 50-32-8 | Benzo(a)Pyrene | 350 | U | |
| 193-39-5 | Indeno(1,2,3-cd)Pyrene | 350 | U | |
| 53-70-3 | Dibenz(a,h)Anthracene | 350 | U | |
| 191-24-2 | Benzo(g,h,i)Perylene | 350 | U | |

(1) - Cannot be separated from Diphenylamine

Verified

3/3/94

FORM I SV-2

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1F
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.
299-W19-95
B09332
60-62.5'

Lab Name: TMA/ARLI Contract: WHC

Lab Code: TMALA Case No.: 09028 SAS No.: NA SDG No.: NA

Matrix: (soil/water) SOIL Lab Sample ID: A309028-01D

Sample wt/vol: 30.4 (g/mL) G Lab File ID: 30928S03

Level: (low/med) LOW Date Received: 09/14/93

% Moisture: 6 decanted: (Y/N) N Date Extracted: 09/16/93

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 09/28/93

Injection Volume: 2.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 9.4

Number TICs found: 2

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

| CAS NUMBER | COMPOUND NAME | RT | EST. CONC. | Q |
|---|---|---|---|---|
| ~~1. 123-42-2~~ | ~~4-HYDROXY-4-METHYL-2-PENTANO~~ | ~~6.28~~ | ~~80000~~ | ~~BAJ~~ |
| 2. | UNKNOWN HYDROCARBON | 6.85 | 70 | ~~BJ~~ |

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R
U
J

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verified 3/17/94

FORM I SV-TIC

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1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

~~000216~~
EPA SAMPLE NO.
299-W19-97

B09333
SO-52.5'

Lab Name: TMA/ARLI Contract: WHC

Lab Code: TMALA Case No.: 09028 SAS No.: NA SDG No.: NA

Matrix: (soil/water) SOIL Lab Sample ID: A309028-02B

Sample wt/vol: 30.7 (g/mL) G Lab File ID: 30928S04

Level: (low/med) LOW Date Received: 09/14/93

% Moisture: 17 decanted: (Y/N) N Date Extracted: 09/16/93

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 09/28/93

Injection Volume: 2.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 8.9

9413225.1710

| CAS NO. | COMPOUND | CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG | Q |
|---|---|---|---|
| 108-95-2 | Phenol | 390 | U |
| 111-44-4 | bis(2-Chloroethyl)Ether | 390 | U |
| 95-57-8 | 2-Chlorophenol | 390 | U |
| 541-73-1 | 1,3-Dichlorobenzene | 390 | U |
| 106-46-7 | 1,4-Dichlorobenzene | 390 | U |
| 95-50-1 | 1,2-Dichlorobenzene | 390 | U |
| 95-48-7 | 2-Methylphenol | 390 | U |
| 108-60-1 | 2,2'-oxybis(1-Chloropropane) | 390 | U |
| 106-44-5 | 4-Methylphenol | 390 | U |
| 621-64-7 | N-Nitroso-Di-n-Propylamine | 390 | U |
| 67-72-1 | Hexachloroethane | 390 | U |
| 98-95-3 | Nitrobenzene | 390 | U |
| 78-59-1 | Isophorone | 390 | U |
| 88-75-5 | 2-Nitrophenol | 390 | U |
| 105-67-9 | 2,4-Dimethylphenol | 390 | U |
| 111-91-1 | bis(2-Chloroethoxy)Methane | 390 | U |
| 120-83-2 | 2,4-Dichlorophenol | 390 | U |
| 120-82-1 | 1,2,4-Trichlorobenzene | 390 | U |
| 91-20-3 | Naphthalene | 390 | U |
| 106-47-8 | 4-Chloroaniline | 390 | U |
| 87-68-3 | Hexachlorobutadiene | 390 | U |
| 59-50-7 | 4-Chloro-3-Methylphenol | 390 | U |
| 91-57-6 | 2-Methylnaphthalene | 390 | U |
| 77-47-4 | Hexachlorocyclopentadiene | 390 | U |
| 88-06-2 | 2,4,6-Trichlorophenol | 390 | U |
| 95-95-4 | 2,4,5-Trichlorophenol | 940 | U |
| 91-58-7 | 2-Chloronaphthalene | 390 | U |
| 88-74-4 | 2-Nitroaniline | 940 | U |
| 131-11-3 | Dimethylphthalate | 390 | U |
| 208-96-8 | Acenaphthylene | 390 | U |
| 99-09-2 | 3-Nitroaniline | 940 | U |
| 83-32-9 | Acenaphthene | 390 | U |
| 51-28-5 | 2,4-Dinitrophenol | 940 | U |

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FORM I SV-1

verified 3/3/94

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1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
299-619-97

B09333
50-52.5'

Lab Name: TMA/ARLI Contract: WHC

Lab Code: TMALA Case No.: 09028 SAS No.: NA SDG No.: NA

Matrix: (soil/water) SOIL Lab Sample ID: A309028-02B

Sample wt/vol: 30.7 (g/mL) G Lab File ID: 30928S04

Level: (low/med) LOW Date Received: 09/14/93

% Moisture: 17 decanted: (Y/N) N Date Extracted: 09/16/93

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 09/28/93

Injection Volume: 2.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 8.9

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| CAS NO. | COMPOUND | CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG | Q | Q |
|---|---|---|---|---|
| 100-02-7 | 4-Nitrophenol | 940 | U | |
| 132-64-9 | Dibenzofuran | 390 | U | |
| 121-14-2 | 2,4-Dinitrotoluene | 390 | U | |
| 606-20-2 | 2,6-Dinitrotoluene | 390 | U | |
| 84-66-2 | Diethylphthalate | 390 | U | |
| 7005-72-3 | 4-Chlorophenyl-phenylether | 390 | U | |
| 86-73-7 | Fluorene | 390 | U | |
| 100-01-6 | 4-Nitroaniline | 940 | U | |
| 534-52-1 | 4,6-Dinitro-2-methylphenol | 940 | U | |
| 86-30-6 | N-Nitrosodiphenylamine (1) | 390 | U | |
| 101-55-3 | 4-Bromophenyl-phenylether | 390 | U | |
| 118-74-1 | Hexachlorobenzene | 390 | U | |
| 87-86-5 | Pentachlorophenol | 940 | U | |
| 85-01-8 | Phenanthrene | 390 | U | |
| 120-12-7 | Anthracene | 390 | U | |
| 86-74-8 | Carbazole | 390 | U | |
| 84-74-2 | Di-n-Butylphthalate | 390 ~~290~~ | ~~BJ~~ | u |
| 206-44-0 | Fluoranthene | 390 | U | |
| 129-00-0 | Pyrene | 390 | U | |
| 85-68-7 | Butylbenzylphthalate | 390 | U | |
| 91-94-1 | 3,3'-Dichlorobenzidine | 390 | U | |
| 56-55-3 | Benzo(a)Anthracene | 390 | U | |
| 117-81-7 | bis(2-Ethylhexyl)Phthalate | 390 ~~84~~ | ~~BJ~~ | u |
| 218-01-9 | Chrysene | 390 | U | |
| 117-84-0 | Di-n-Octyl Phthalate | 390 | U | |
| 205-99-2 | Benzo(b)Fluoranthene | 390 | U | |
| 207-08-9 | Benzo(k)Fluoranthene | 390 | U | |
| 50-32-8 | Benzo(a)Pyrene | 390 | U | |
| 193-39-5 | Indeno(1,2,3-cd)Pyrene | 390 | U | |
| 53-70-3 | Dibenz(a,h)Anthracene | 390 | U | |
| 191-24-2 | Benzo(g,h,i)Perylene | 390 | U | |

(1) - Cannot be separated from Diphenylamine

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Verified

3/3/94

FORM I SV-2

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~~000210~~

1F
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.
299-W19-97
B09333
50-52.5'

Lab Name: TMA/ARLI Contract: WHC

Lab Code: TMALA Case No.: 09028 SAS No.: NA SDG No.: NA

Matrix: (soil/water) SOIL Lab Sample ID: A309028-02B

Sample wt/vol: 30.7 (g/mL) G Lab File ID: 30928S04

Level: (low/med) LOW Date Received: 09/14/93

% Moisture: 17 decanted: (Y/N) N Date Extracted: 09/16/93

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 09/28/93

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 8.9

Number TICs found: 6

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

| CAS NUMBER | COMPOUND NAME | RT | EST. CONC. | Q | |
|---|---|---|---|---|---|
| ~~1. 123-42-2~~ | ~~4-HYDROXY-4-METHYL-2-PENTANO~~ | ~~6.28~~ | ~~82000~~ | ~~BAJ~~ | UR |
| 2. | UNKNOWN HYDROCARBON | 6.85 | 79 | ~~BJ~~ | UJ |
| 3. | UNKNOWN HYDROCARBON | 7.42 | 1300 | ~~J~~ JN | ~~UJ~~ |
| 4. | UNKNOWN HYDROCARBON | 8.73 | 120 | ~~J~~ | JN |
| 5. | PROPANOIC ACID ESTER ISOMER | 18.10 | 350 | ~~J~~ | JN |
| 6. | HEXANEDIOIC ACID ESTER ISOME | 26.22 | 270 | ~~J~~ | JN |

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Verified

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FORM I SV-TIC

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1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
299-W-19-95

B09336
74.8-77.3'

Lab Name: TMA/ARLI Contract: WHC

Lab Code: TMALA Case No.: 09028 SAS No.: NA SDG No.: NA

Matrix: (soil/water) SOIL Lab Sample ID: A309028-03B

Sample wt/vol: 30.8 (g/mL) G Lab File ID: 30928S07

Level: (low/med) LOW Date Received: 09/14/93

% Moisture: 3 decanted: (Y/N) N Date Extracted: 09/16/93

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 09/28/93

Injection Volume: 2.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 9.4

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| CAS NO. | COMPOUND | CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG | Q | Q |
|---|---|---|---|---|
| 108-95-2 | Phenol | 330 ~~50~~ | ~~J~~ | U |
| 111-44-4 | bis(2-Chloroethyl)Ether | 330 | U | |
| 95-57-8 | 2-Chlorophenol | 330 | U | |
| 541-73-1 | 1,3-Dichlorobenzene | 330 | U | |
| 106-46-7 | 1,4-Dichlorobenzene | 330 | U | |
| 95-50-1 | 1,2-Dichlorobenzene | 330 | U | |
| 95-48-7 | 2-Methylphenol | 330 | U | |
| 108-60-1 | 2,2'-oxybis(1-Chloropropane) | 330 | U | |
| 106-44-5 | 4-Methylphenol | 330 | U | |
| 621-64-7 | N-Nitroso-Di-n-Propylamine | 330 | U | |
| 67-72-1 | Hexachloroethane | 330 | U | |
| 98-95-3 | Nitrobenzene | 330 | U | |
| 78-59-1 | Isophorone | 330 | U | |
| 88-75-5 | 2-Nitrophenol | 330 | U | |
| 105-67-9 | 2,4-Dimethylphenol | 330 | U | |
| 111-91-1 | bis(2-Chloroethoxy)Methane | 330 | U | |
| 120-83-2 | 2,4-Dichlorophenol | 330 | U | |
| 120-82-1 | 1,2,4-Trichlorobenzene | 330 | U | |
| 91-20-3 | Naphthalene | 330 | U | |
| 106-47-8 | 4-Chloroaniline | 330 | U | |
| 87-68-3 | Hexachlorobutadiene | 330 | U | |
| 59-50-7 | 4-Chloro-3-Methylphenol | 330 | U | |
| 91-57-6 | 2-Methylnaphthalene | 330 | U | |
| 77-47-4 | Hexachlorocyclopentadiene | 330 | U | |
| 88-06-2 | 2,4,6-Trichlorophenol | 330 | U | |
| 95-95-4 | 2,4,5-Trichlorophenol | 800 | U | |
| 91-58-7 | 2-Chloronaphthalene | 330 | U | |
| 88-74-4 | 2-Nitroaniline | 800 | U | |
| 131-11-3 | Dimethylphthalate | 330 | U | |
| 208-96-8 | Acenaphthylene | 330 | U | |
| 99-09-2 | 3-Nitroaniline | 800 | U | |
| 83-32-9 | Acenaphthene | 330 | U | |
| 51-28-5 | 2,4-Dinitrophenol | 800 | U | |

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FORM I SV-1

verified 3/3/94

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1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.
299-W19-95

B09336
74.8-77.3'

Lab Name: TMA/ARLI Contract: WHC

Lab Code: TMALA Case No.: 09028 SAS No.: NA SDG No.: NA

Matrix: (soil/water) SOIL Lab Sample ID: A309028-03B

Sample wt/vol: 30.8 (g/mL) G Lab File ID: 30928S07

Level: (low/med) LOW Date Received: 09/14/93

% Moisture: 3 decanted: (Y/N) N Date Extracted: 09/16/93

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 09/28/93

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 9.4

9413225.1714

| CAS NO. | COMPOUND | CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG | Q | Q |
|---|---|---|---|---|
| 100-02-7 | 4-Nitrophenol | 800 | U | |
| 132-64-9 | Dibenzofuran | 330 | U | |
| 121-14-2 | 2,4-Dinitrotoluene | 330 | U | |
| 606-20-2 | 2,6-Dinitrotoluene | 330 | U | |
| 84-66-2 | Diethylphthalate | 330 | U | |
| 7005-72-3 | 4-Chlorophenyl-phenylether | 330 | U | |
| 86-73-7 | Fluorene | 330 | U | |
| 100-01-6 | 4-Nitroaniline | 800 | U | |
| 534-52-1 | 4,6-Dinitro-2-methylphenol | 800 | U | |
| 86-30-6 | N-Nitrosodiphenylamine (1) | 330 | U | |
| 101-55-3 | 4-Bromophenyl-phenylether | 330 | U | |
| 118-74-1 | Hexachlorobenzene | 330 | U | |
| 87-86-5 | Pentachlorophenol | 800 | U | |
| 85-01-8 | Phenanthrene | 330 | U | |
| 120-12-7 | Anthracene | 330 | U | |
| 86-74-8 | Carbazole | 330 | U | |
| 84-74-2 | Di-n-Butylphthalate | 330 ~~260~~ | ~~BJ~~ | u |
| 206-44-0 | Fluoranthene | 330 | U | |
| 129-00-0 | Pyrene | 330 | U | |
| 85-68-7 | Butylbenzylphthalate | 330 | U | |
| 91-94-1 | 3,3'-Dichlorobenzidine | 330 | U | |
| 56-55-3 | Benzo(a)Anthracene | 330 | U | |
| 117-81-7 | bis(2-Ethylhexyl)Phthalate | 330 ~~180~~ | ~~BJ~~ | u |
| 218-01-9 | Chrysene | 330 | U | |
| 117-84-0 | Di-n-Octyl Phthalate | 330 | U | |
| 205-99-2 | Benzo(b)Fluoranthene | 330 | U | |
| 207-08-9 | Benzo(k)Fluoranthene | 330 | U | |
| 50-32-8 | Benzo(a)Pyrene | 330 | U | |
| 193-39-5 | Indeno(1,2,3-cd)Pyrene | 330 | U | |
| 53-70-3 | Dibenz(a,h)Anthracene | 330 | U | |
| 191-24-2 | Benzo(g,h,i)Perylene | 330 | U | |

(1) - Cannot be separated from Diphenylamine

verified

3/3/94

FORM I SV-2

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1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.
299-W19-95

B09336
74.8-77.3'

Lab Name: TMA/ARLI Contract: WHC

Lab Code: TMALA Case No.: 09028 SAS No.: NA SDG No.: NA

Matrix: (soil/water) SOIL Lab Sample ID: A309028-03B

Sample wt/vol: 30.8 (g/mL) G Lab File ID: 30928S07

Level: (low/med) LOW Date Received: 09/14/93

% Moisture: 3 decanted: (Y/N) N Date Extracted: 09/16/93

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 09/28/93

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 9.4

9413225.1715

Number TICs found: 4

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

| CAS NUMBER | COMPOUND NAME | RT | EST. CONC. | Q |
|---|---|---|---|---|
| ~~1. 123-42-2~~ | ~~4-HYDROXY-4-METHYL-2-PENTANO~~ | ~~6.32~~ | ~~78000~~ | ~~BAJ~~ |
| 2. | UNKNOWN HYDROCARBON | 6.87 | 67 | ~~BJ~~ |
| 3. | UNKNOWN HYDROCARBON | 7.45 | 1100 | ~~J~~ |
| 4. | HEXANEDIOIC ACID ESTER ISOME | 26.23 | 340 | ~~J~~ |

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UNCERTAIN



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3/3/94

FORM I SV-TIC 3/90

ATTACHMENT 4

LABORATORY NARRATIVE AND CHAIN-OF-CUSTODY DOCUMENTATION

PM3225.1716

# CASE NARRATIVE

LABORATORY : TMA/ARLI

CASE : 09-028

CONTRACT ID : WESTINGHOUSE HANFORD COMPANY

SDG RECEIPT DATE : September 14, 1993

## 1.0 DESCRIPTION OF CASE :

Four soil samples were analyzed for TCL Organics- Volatiles and Semivolatiles according to the USEPA Contract Laboratory Program (CLP) Statement of Work for Organic Analysis, Revision OLM01.8. The Extractable Hydrocarbons in the Kerosene Range (K) were analyzed according to the SW-846 Method 8015M.

## 2.0 SAMPLE LIST :

| WESTINGHOUSE ID | LAB ID | ANALYSIS REQUESTED | MATRIX |
|---|---|---|---|
| B09332 | A3-09-028-01A | V | SOIL |
| B09332 MS | A3-09-028-01B | V | SOIL |
| B09332 MSD | A3-09-028-01C | V | SOIL |
| B09332 | A3-09-028-01D | SV | SOIL |
| B09332 | A3-09-028-01G | K | SOIL |
| B09333 | A3-09-028-02A | V | SOIL |
| B09333 | A3-09-028-02B | SV | SOIL |
| B09333 MS | A3-09-028-02C | SV | SOIL |
| B09333 MSD | A3-09-028-02D | SV | SOIL |
| B09333 | A3-09-028-02G | K | SOIL |
| B09336 | A3-09-028-03A | V | SOIL |
| B09336 | A3-09-028-03B | SV | SOIL |
| B09336 | A3-09-028-03D | K | SOIL |
| B09336 MS | A3-09-028-03E | K | SOIL |
| B09336 MSD | A3-09-028-03F | K | SOIL |
| B09335 | A3-09-028-04A | V | SOIL |

## 3.0 COMMENTS :

### 3.1 SHIPPING AND DOCUMENTATION :

All of the samples were received intact and properly documented.

### 3.2 ANALYSIS

#### 3.2.1 VOLATILE ANALYSIS COMMENTS :

LOW LEVEL SOIL :

The samples were analyzed by heated purge within the CLP SOW holding times.

All of the QC results were within the limits specified by the EPA CLP SOW.

TUNES :

All BFB tunes were injected directly into the GC/MS instrument.

3.2.2 SEMIVOLATILE ANALYSIS COMMENTS :

LOW LEVEL SOIL :

The samples were extracted and analyzed within the CLP SOW holding times. Phenol was detected in sample B09336 at a concentration that was below the CRQL.

The matrix spike recovery of 2,4-Dinitrotoluene in sample B09333MS was slightly above the QC limits. In accordance with the protocol, no further action was required.

All of the other QC results were within the limits specified by the EPA CLP SOW.

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3.2.3 EXTRACTABLE HYDROCARBONS "KEROSENE RANGE" COMMENTS :

SEQUENCE NOTES :

The sequence was started on 09/16/93 and was analyzed according to the SW-846 Method 8015M. The initial calibration consisted of 5 different levels of the Kerosene standard that ranged from 200ppm to 2000ppm. The continuing calibration at the 1000ppm level was injected amongst a series of samples, in order to verify the instrument stability. The %RSD in the initial calibration and the %D in the continuing calibration were below their 20% and 15% limits, respectively.

SAMPLE NOTES :

LOW LEVEL SOIL :

The samples were extracted and analyzed for extractable hydrocarbons in the Kerosene range within the required holding times. Approximately 20 g of each sample was extracted and concentrated to 5 mL.

There were no hydrocarbons detected in any of the samples. Sample B09336 was spiked with Kerosene and the matrix spike recoveries were 85% and 93%. A blank spike was prepared at the same time, and had an 79% recovery.

All of the QC results were within the limits specified by the SW-846 Method 8015M.

We certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data in this hardcopy data package and in the computer-readable data submitted on diskette is authorized by the Laboratory Manager or his designee, as verified by the following signatures.

Nicole Roth 11/29/93
Nicole Roth
CLP Program Manager

Maureen Parrish 11/29/93
Maureen Parrish
Project Manager

9413225.1719

~~000002A~~

Westinghouse Hanford Company

# CHAIN OF CUSTODY

Custody Form Initiator: L E ROGERS

Company Contact: L E ROGERS

Telephone: 376-7690

Project Designation/Sampling Locations: 200-UP-2

Collection Date: 9-9-93

Ice Chest No.: SML 366

Field Logbook No.: EFL-1091

Bill of Lading/Airbill No.:

Offsite Property No.:

Method of Shipment: OVERNIGHT AIR SERVICE

Shipped to: TMA

Possible Sample Hazards/Remarks: Keep samples at 4C (SOIL) NONE DETECTABLE

## Sample Identification

1) B09332

1,250ml P:CLP;TAL Metals,Hg,Ti
~~1,250ml~~ 1,120ml Gs:VOA CLP
1,250ml nG:Semi-VOA CLP
1,125ml G:Anions F,Cl,SO4 (EPA 300.0)
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,125ml G:Cyanide CLP
1,125ml Gw:Kerosene (8015M)
1,1000ml P/G:Gross alpha/beta (EP-10), Gamma Spec to include,Cs-134,Cs-137,Co-60,Eu-152, Eu-154,Eu-155,K-40,Ru-106,Na-22 (RC-30), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5) Np-237,(RC-101A, RC-622, EP-5) Pu-238,Pu-239/240 (EP-80, EP-81, EP-5) I-129 (RC-25, RC-605) Sr-90 (RC-306, RC-303, RC-309, RC-304) Tc-99 (RC-24, RC-604) Am-241,Cm-244 (EP-80, EP-90, EP-91, EP-92, EP-93, EP-5) Se-79

9-10-93

2) ~~B09334~~ B09335

~~1,250ml P:CLP;TAL Metals,Hg,Ti~~
~~1,250ml~~ 1,120ml Gs:VOA CLP
~~1,250ml nG:Semi-VOA CLP~~
~~1,125ml G:Anions F,Cl,SO4 (EPA 300.0)~~
~~1,125ml P/G:Anions NO2,NO3 (EPA 353.2)~~
~~1,125ml G:Cyanide CLP~~
~~1,125ml Gw:Kerosene (8015M)~~
~~1,1000ml P/G:Gross alpha/beta (EP-10), Gamma Spec to include,Cs-134,Cs-137,Co-60,Eu-152, Eu-154,Eu-155,K-40,Ru-106,Na-22 (RC-30), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5) Np-237,(RC-101A, RC-622, EP-5) Pu-238,Pu-239/240 (EP-80, EP-81, EP-5) I-129 (RC-25, RC-605) Sr-90 (RC-306, RC-303, RC-309, RC-304) Tc-99 (RC-24, RC-604) Am-241,Cm-244 (EP-80, EP-90, EP-91, EP-92, EP-93, EP-5) Se-79~~

9-10-93

3)

1,250ml P:CLP;TAL Metals,Hg,Ti
~~1,250ml Gs:VOA CLP~~
1,250ml nG:Semi-VOA CLP
1,125ml G:Anions F,Cl,SO4 (EPA 300.0)
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,125ml G:Cyanide CLP
1,125ml Gw:Kerosene (8015M)
1,1000ml P/G:Gross alpha/beta (EP-10), Gamma Spec to include,Cs-134,Cs-137,Co-60,Eu-152, Eu-154,Eu-155,K-40,Ru-106,Na-22 (RC-30), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5) Np-237,(RC-101A, RC-622, EP-5) Pu-238,Pu-239/240 (EP-80, EP-81, EP-5) I-129 (RC-25, RC-605) Sr-90 (RC-306, RC-303, RC-309, RC-304) Tc-99 (RC-24, RC-604) Am-241,Cm-244 (EP-80, EP-90, EP-91, EP-92, EP-93, EP-5) Se-79

[] Field Transfer of Custody

| Chain of Possession (Sign and Print Names) | | |
|---|---|---|
| Relinquished by: 1040 Karen E. Rogers 9-10-93 | Received by: Roy T. Sichle | Date/Time: 1040 9-10-93 |
| Relinquished by: Roy T. Sichle 1054 9-10-93 | Received by: H. Narciso | Date/Time: 9-14-93 10:50 |
| Relinquished by: | Received by: | Date/Time: |
| Relinquished by: | Received by: | Date/Time: |

## Final Sample Disposition

| Disposal Method: | Disposed by: | Date/Time: |
|---|---|---|

Comments:

A-6000-407 (12/90) (EF) WEF061
Chain of Custody

000002C

| Westinghouse Hanford Company | CHAIN OF CUSTODY |
|---|---|

Custody Form Initiator: L E ROGERS

Company Contact: L E ROGERS — Telephone: 376-7690

Project Designation/Sampling Locations: 200-UP-2 — Collection Date: 9-10-93

Ice Chest No.: SML 366 — Field Logbook No.: EFL-1091

Bill of Lading/Airbill No.: — Offsite Property No.:

Method of Shipment: OVERNIGHT AIR SERVICE

Shipped to: TMA

Possible Sample Hazards/Remarks: Keep samples at 4C (SOIL) NONE DETECTED

**Sample Identification**

1) B09333

1,250ml P:CLP;TAL Metals,Hg,Ti
1,250ml Gs:VOA CLP
1,250ml aG:Semi-VOA CLP
1,125ml G:Anions F,Cl,SO4 (EPA 300.0)
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,125ml G:Cyanide CLP
1,125ml Gw:Kerosene (8015M)
1,1000ml P/G:Gross alpha/beta (EP-10), Gamma Spec to include,Cs-134,Cs-137,Co-60,Eu-152, Eu-154,Eu-155,K-40,Ru-106,Na-22 (RC-30), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5) Np-237,(RC-101A, RC-622, EP-5) Pu-238,Pu-239/240 (EP-80, EP-81, EP-5) I-129 (RC-25, RC-605) Sr-90 (RC-306, RC-303, RC-309, RC-304) Tc-99 (RC-24, RC-604) Am-241,Cm-244 (EP-80, EP-90, EP-91, EP-92, EP-93, EP-5) Se-79

2) B09336

1,250ml P:CLP;TAL Metals,Hg,Ti
~~1,250ml~~ 1,250ml Gs:VOA CLP
1,250ml aG:Semi-VOA CLP
1,125ml G:Anions F,Cl,SO4 (EPA 300.0)
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,125ml G:Cyanide CLP
1,125ml Gw:Kerosene (8015M)
1,1000ml P/G:Gross alpha/beta (EP-10), Gamma Spec to include,Cs-134,Cs-137,Co-60,Eu-152, Eu-154,Eu-155,K-40,Ru-106,Na-22 (RC-30), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5) Np-237,(RC-101A, RC-622, EP-5) Pu-238,Pu-239/240 (EP-80, EP-81, EP-5) I-129 (RC-25, RC-605) Sr-90 (RC-306, RC-303, RC-309, RC-304) Tc-99 (RC-24, RC-604) Am-241,Cm-244 (EP-80, EP-90, EP-91, EP-92, EP-93, EP-5) Se-79

90ml HR 9-10-93

3)

1,250ml P:CLP;TAL Metals,Hg,Ti
1,250ml Gs:VOA CLP
1,250ml aG:Semi-VOA CLP
1,125ml G:Anions F,Cl,SO4 (EPA 300.0)
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,125ml G:Cyanide CLP
1,125ml Gw:Kerosene (8015M)
1,1000ml P/G:Gross alpha/beta (EP-10), Gamma Spec to include,Cs-134,Cs-137,Co-60,Eu-152, Eu-154,Eu-155,K-40,Ru-106,Na-22 (RC-30), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5) Np-237,(RC-101A, RC-622, EP-5) Pu-238,Pu-239/240 (EP-80, EP-81, EP-5) I-129 (RC-25, RC-605) Sr-90 (RC-306, RC-303, RC-309, RC-304) Tc-99 (RC-24, RC-604) Am-241,Cm-244 (EP-80, EP-90, EP-91, EP-92, EP-93, EP-5) Se-79

HR 9-10-93

[] Field Transfer of Custody — Chain of Possession — (Sign and Print Names)

| Relinquished by: | Received by: | Date/Time: |
|---|---|---|
| 1040 Lorne E. Rogers 9-10-93 | R. J. T. Schulte | 9-10-93 1040 |
| Relinquished by: R. J. T. Schulte 1054 9-10-93 | Received by: H. Harris | Date/Time: 9-14-93 10:50 |
| Relinquished by: | Received by: | Date/Time: |
| Relinquished by: | Received by: | Date/Time: |

**Final Sample Disposition**

| Disposal Method: | Disposed by: | Date/Time: |
|---|---|---|

Comments:

A-6000-407 (12/90) (EF) WEF061
Chain of Custody

ATTACHMENT 5

DATA VALIDATION SUPPORTING DOCUMENTATION

94/3225.1722

# GC/MS ORGANIC DATA VALIDATION CHECKLIST

| VALIDATION LEVEL: | A | B | C | D | E |
|---|---|---|---|---|---|

| | | |
|---|---|---|
| PROJECT: 200-UP-2 | | DATA PACKAGE: B09332-TMA-611 |
| VALIDATOR: [illegible] | LAB: TMA | DATE: 03/03/94 |
| CASE: | | SDG: B09332-TMA-611 |

ANALYSES PERFORMED

| ☐ CLP Volatiles | ☐ SW-846 8240 (cap column) | ☐ SW-846 8260 (packed column) | ☒ CLP Semivolatiles | ☐ SW-846 8270 (cap column) | ☐ SW-846 (packed column) |
|---|---|---|---|---|---|
| ☐ | ☐ | ☐ | ☐ | ☐ | ☐ |

| SAMPLES/MATRIX Soils |
|---|
| B09332 |
| B09333 |
| B09336 |
| |
| |

9413225.1723

## 1. DATA PACKAGE COMPLETENESS AND CASE NARRATIVE

Is technical verification documentation present? . . . . . (Yes) No N/A

Is a case narrative present? . . . . . (Yes) No N/A

Comments:

## 2. HOLDING TIMES

Are sample holding times acceptable? . . . . . (Yes) No N/A

Comments:

026

GC/MS ORGANIC DATA VALIDATION CHECKLIST

3. INSTRUMENT TUNING AND CALIBRATION

Is the GC/MS tuning/performance check acceptable? . . . . . Yes No N/A

Are initial calibrations acceptable? . . . . . Yes No N/A

Are continuing calibrations acceptable? . . . . . Yes No N/A

Comments: See comments 1 and 2 on last page of checklist.

4. BLANKS

Were laboratory blanks analyzed? . . . . . Yes No N/A

Are laboratory blank results acceptable? . . . . . Yes No N/A

Were field/trip blanks analyzed? . . . . . Yes No N/A

Are field/trip blank results acceptable? . . . . . Yes No N/A

Comments: Di-n-butylphthalate, bis(2-ethylhexyl)phthalate, and phenol are present in the laboratory blank. See attachments for blank concentrations. Phenol was present, the calculation for phenol conc. is included on the attached quant. form.

5. ACCURACY

Were surrogates/System Monitoring Compounds analyzed? . . . . . Yes No N/A

Are surrogate/System Monitoring Compound recoveries acceptable? Yes No N/A

Were MS/MSD samples analyzed? . . . . . Yes No N/A

Are MS/MSD results acceptable? . . . . . Yes No N/A

Comments:

The MS%R for 2,4-Dinitrotoluene is 93%, the control limits are 28 to 89%. However, no qualification is required since all surrogates are within limits and the 2,4-dinitrotoluene MS%R is close to 100%, which is ideal.



-027

9413225.1724

GC/MS ORGANIC DATA VALIDATION CHECKLIST

Comments (attach additional sheets as necessary):

(1) The minimum RRF for surrogate 1,2-dichlorobenzene-d4 is 0.400 according to the SOW, the laboratory has recorded 0.800 on the CCV form. No qualification is required.

(2) The laboratory used 20 ng/ul of internal standard instead of the specified amount of 40 ng/ul. No qualification is required, however, a factor of 2 is included in the result calculations.

9413225.1725

GC/MS ORGANIC DATA VALIDATION CHECKLIST

6. PRECISION

Are MS/MSD RPD values acceptable? . . . . . Yes No N/A

Are field duplicate RPD values acceptable? . . . . . Yes No N/A

Are field split RPD values acceptable? . . . . . Yes No N/A

Comments:

7. SYSTEM PERFORMANCE

Were internal standards analyzed? . . . . . Yes No N/A

Are internal standard areas acceptable? . . . . . Yes No N/A

Are internal standard retention times acceptable? . . . . . Yes No N/A

Comments:

8. COMPOUND IDENTIFICATION AND QUANTITATION

Is compound identification acceptable? . . . . . Yes No N/A

Is compound quantitation acceptable? . . . . . Yes No N/A

Comments:

9. REPORTED RESULTS AND QUANTITATION LIMITS

Are results reported for all requested analyses? . . . . . Yes No N/A

Are all results supported in the raw data? . . . . . Yes No N/A

Do results meet the CRQLs? . . . . . Yes No N/A

Has the laboratory properly identified and coded all TIC? . . . Yes No N/A

Comments:

9413225.1726

# HOLDING TIME SUMMARY

B09332-TMA-611

| SDG: | VALIDATOR: | DATE: 3/3/94 | PAGE 1 OF 1 |
|---|---|---|---|
| COMMENTS: Semivolatile Organics | | | |

| FIELD SAMPLE ID | ANALYSIS TYPE | DATE SAMPLED | DATE PREPARED | DATE ANALYZED | PREP. HOLDING TIME, DAYS | ANALYSIS HOLDING TIME, DAYS | QUALIFIER |
|---|---|---|---|---|---|---|---|
| B09332 | BNA | 9/09/93 | 9/16/93 | 9/28/93 | 7 | 12 | None |
| B09333 | ↓ | 9/10/93 | ↓ | 9/28/93 | 6 | 12 | ↓ |
| B09336 | ↓ | 9/10/93 | ↓ | 9/28/93 | 6 | 12 | ↓ |

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

~~000318~~
EPA SAMPLE NO.

SBLK0916S

Lab Name: TMA/ARLI Contract: WHC

Lab Code: TMALA Case No.: 09028 SAS No.: NA SDG No.: NA

Matrix: (soil/water) SOIL Lab Sample ID: A309028-BLK

Sample wt/vol: 30.4 (g/mL) G Lab File ID: 30928S02

Level: (low/med) LOW Date Received: _____

% Moisture: _____ decanted: (Y/N) N Date Extracted: 09/16/93

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 09/28/93

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: ____

9413225.1728

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

| CAS NO. | COMPOUND | | Q | |
|---|---|---|---|---|
| 108-95-2 | Phenol | 15 ~~330~~ | ~~U~~ | 5 |
| 111-44-4 | bis(2-Chloroethyl)Ether | 330 | U | |
| 95-57-8 | 2-Chlorophenol | 330 | U | |
| 541-73-1 | 1,3-Dichlorobenzene | 330 | U | |
| 106-46-7 | 1,4-Dichlorobenzene | 330 | U | |
| 95-50-1 | 1,2-Dichlorobenzene | 330 | U | |
| 95-48-7 | 2-Methylphenol | 330 | U | |
| 108-60-1 | 2,2'-oxybis(1-Chloropropane) | 330 | U | |
| 106-44-5 | 4-Methylphenol | 330 | U | |
| 621-64-7 | N-Nitroso-Di-n-Propylamine | 330 | U | |
| 67-72-1 | Hexachloroethane | 330 | U | |
| 98-95-3 | Nitrobenzene | 330 | U | |
| 78-59-1 | Isophorone | 330 | U | |
| 88-75-5 | 2-Nitrophenol | 330 | U | |
| 105-67-9 | 2,4-Dimethylphenol | 330 | U | |
| 111-91-1 | bis(2-Chloroethoxy)Methane | 330 | U | |
| 120-83-2 | 2,4-Dichlorophenol | 330 | U | |
| 120-82-1 | 1,2,4-Trichlorobenzene | 330 | U | |
| 91-20-3 | Naphthalene | 330 | U | |
| 106-47-8 | 4-Chloroaniline | 330 | U | |
| 87-68-3 | Hexachlorobutadiene | 330 | U | |
| 59-50-7 | 4-Chloro-3-Methylphenol | 330 | U | |
| 91-57-6 | 2-Methylnaphthalene | 330 | U | |
| 77-47-4 | Hexachlorocyclopentadiene | 330 | U | |
| 88-06-2 | 2,4,6-Trichlorophenol | 330 | U | |
| 95-95-4 | 2,4,5-Trichlorophenol | 790 | U | |
| 91-58-7 | 2-Chloronaphthalene | 330 | U | |
| 88-74-4 | 2-Nitroaniline | 790 | U | |
| 131-11-3 | Dimethylphthalate | 330 | U | |
| 208-96-8 | Acenaphthylene | 330 | U | |
| 99-09-2 | 3-Nitroaniline | 790 | U | |
| 83-32-9 | Acenaphthene | 330 | U | |
| 51-28-5 | 2,4-Dinitrophenol | 790 | U | |

FORM I SV-1

3/3/94

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

SBLK0916S

Lab Name: TMA/ARLI Contract: WHC

Lab Code: TMALA Case No.: 09028 SAS No.: NA SDG No.: NA

Matrix: (soil/water) SOIL Lab Sample ID: A309028-BLK

Sample wt/vol: 30.4 (g/mL) G Lab File ID: 30928S02

Level: (low/med) LOW Date Received: _____

% Moisture: _____ decanted: (Y/N) N Date Extracted: 09/16/93

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 09/28/93

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: ____

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG

| CAS NO. | COMPOUND | | Q |
|---|---|---|---|
| 100-02-7 | 4-Nitrophenol | 790 | U |
| 132-64-9 | Dibenzofuran | 330 | U |
| 121-14-2 | 2,4-Dinitrotoluene | 330 | U |
| 606-20-2 | 2,6-Dinitrotoluene | 330 | U |
| 84-66-2 | Diethylphthalate | 330 | U |
| 7005-72-3 | 4-Chlorophenyl-phenylether | 330 | U |
| 86-73-7 | Fluorene | 330 | U |
| 100-01-6 | 4-Nitroaniline | 790 | U |
| 534-52-1 | 4,6-Dinitro-2-methylphenol | 790 | U |
| 86-30-6 | N-Nitrosodiphenylamine (1) | 330 | U |
| 101-55-3 | 4-Bromophenyl-phenylether | 330 | U |
| 118-74-1 | Hexachlorobenzene | 330 | U |
| 87-86-5 | Pentachlorophenol | 790 | U |
| 85-01-8 | Phenanthrene | 330 | U |
| 120-12-7 | Anthracene | 330 | U |
| 86-74-8 | Carbazole | 330 | U |
| 84-74-2 | Di-n-Butylphthalate | 260 | J |
| 206-44-0 | Fluoranthene | 330 | U |
| 129-00-0 | Pyrene | 330 | U |
| 85-68-7 | Butylbenzylphthalate | 330 | U |
| 91-94-1 | 3,3'-Dichlorobenzidine | 330 | U |
| 56-55-3 | Benzo(a)Anthracene | 330 | U |
| 117-81-7 | bis(2-Ethylhexyl)Phthalate | 420 | |
| 218-01-9 | Chrysene | 330 | U |
| 117-84-0 | Di-n-Octyl Phthalate | 330 | U |
| 205-99-2 | Benzo(b)Fluoranthene | 330 | U |
| 207-08-9 | Benzo(k)Fluoranthene | 330 | U |
| 50-32-8 | Benzo(a)Pyrene | 330 | U |
| 193-39-5 | Indeno(1,2,3-cd)Pyrene | 330 | U |
| 53-70-3 | Dibenz(a,h)Anthracene | 330 | U |
| 191-24-2 | Benzo(g,h,i)Perylene | 330 | U |

(1) - Cannot be separated from Diphenylamine

FORM I SV-2

-032 3/3/90 3/3/94

9413225.1729

1F

# SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
## TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

SBLK0916S

Lab Name: TMA/ARLI Contract: WHC

Lab Code: TMALA Case No.: 09028 SAS No.: NA SDG No.: NA

Matrix: (soil/water) SOIL Lab Sample ID: A309028-BLK

Sample wt/vol: 30.4 (g/mL) G Lab File ID: 30928S02

Level: (low/med) LOW Date Received: _____

% Moisture: _____ decanted: (Y/N) N Date Extracted: 09/16/93

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 09/28/93

Injection Volume: 2.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: ____

Number TICs found: 2

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

| CAS NUMBER | COMPOUND NAME | RT | EST. CONC. | Q |
|---|---|---|---|---|
| ~~1. 123-42-2~~ | ~~4-HYDROXY-4-METHYL-2-PENTANO~~ | ~~6.32~~ | ~~75000~~ | ~~AJ~~ R |
| 2. | UNKNOWN HYDROCARBON | 6.85 | 66 | J XS-33C |

9413225.1730

3/3/94

Lab. Blank
SBLK0916S

~~000325~~

Quantitation Report File: 30928S02

Data: 30928S02.TI
09/28/93 11:32:00
Sample: CLP,09028,,SBLK0916S,L,S,A309028-BLK,BNA,BLANK
Conds.: CAP/.25,30928S01,3DFT0928S01
Formula: 30920SAVG90 Instrument: SHERMA Weight: 0.000
Submitted by: 30G:0.5M Analyst: FH#33S Acct. No.: CALTAB

AMOUNT=AREA * REF AMNT/(REF AREA * RESP FACT)
Resp. fac. from Library Entry

| No | Name | |
|---|---|---|
| 1 | CI30 | *IS1* 1,4-DICHLOROBENZENE-D4 |
| 2 | CI40 | *IS2* NAPHTHALENE-D8 |
| 3 | CI50 | *IS3* ACENAPHTHENE-D10 |
| 4 | CI60 | *IS4* PHENANTHRENE-D10 |
| 5 | CI70 | *IS5* CHRYSENE-D12 |
| 6 | CI75 | *IS6* PERYLENE-D12 |
| 7 | CS50 | *SU1* 2-FLUOROPHENOL |
| 8 | CS45 | *SU2* PHENOL-D5 |
| 9 | CS55 | *SU3* 2,4,6,-TRIBROMOPHENOL |
| 10 | CS20 | *SU4* NITROBENZENE-D5 |
| 11 | CS25 | *SU5* 2-FLUOROBIPHENYL |
| 12 | CS30 | *SU6* TERPHENYL-D14 |
| 13 | CS70 | 2-CHLOROPHENOL-D4 |
| 14 | CS75 | 1,2-DICHLOROBENZENE-D4 |
| 15 | C315 | PHENOL |
| 16 | C325 | BIS(2-CHLOROETHYL)ETHER |
| 17 | C330 | 2-CHLOROPHENOL |
| 18 | C335 | 1,3-DICHLOROBENZENE |
| 19 | C340 | 1,4-DICHLOROBENZENE |
| 20 | C345 | BENZYL ALCOHOL |
| 21 | C350 | 1,2-DICHLOROBENZENE |
| 22 | C355 | 2-METHYLPHENOL |
| 23 | C360 | BIS(2-CHLOROISOPROPYL)ETHER |
| 24 | C365 | 4-METHYLPHENOL |
| 25 | C370 | N-NITROSO-DI-N-PROPYLAMINE |
| 26 | C375 | HEXACHLOROETHANE |
| 27 | C410 | NITROBENZENE |
| 28 | C415 | ISOPHORONE |
| 29 | C420 | 2-NITROPHENOL |
| 30 | C425 | 2,4-DIMETHYLPHENOL |
| 31 | C435 | BIS(2-CHLOROETHOXY)METHANE |
| 32 | C430 | BENZOIC ACID |
| 33 | C440 | 2,4-DICHLOROPHENOL |
| 34 | C445 | 1,2,4-TRICHLOROBENZENE |
| 35 | C450 | NAPHTHALENE |
| 36 | C455 | 4-CHLOROANILINE |
| 37 | C460 | HEXACHLOROBUTADIENE |
| 38 | C465 | 4-CHLORO-3-METHYLPHENOL |
| 39 | C470 | 2-METHYLNAPHTHALENE |
| 40 | C510 | HEXACHLOROCYCLOPENTADIENE |
| 41 | C515 | 2,4,6-TRICHLOROPHENOL |
| 42 | C520 | 2,4,5-TRICHLOROPHENOL |
| 43 | C525 | 2-CHLORONAPHTHALENE |
| 44 | C530 | 2-NITROANILINE |
| 45 | C535 | DIMETHYL PHTHALATE |
| 46 | C540 | ACENAPHTHYLENE |
| 47 | C545 | 3-NITROANILINE |

9413225.1731

034

3/3/94

Lab. Blank

SBLK09165

~~000326~~

| No | Name | |
|---|---|---|
| 48 | C550 | ACENAPHTHENE |
| 49 | C555 | 2,4-DINITROPHENOL |
| 50 | C560 | 4-NITROPHENOL |

F.H. 9/28/9

| No | m/z | Scan | Time | Ref | RRT | Meth | Area(Hght) | Amount | %Tot |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 152 | 739 | 9:20 | 1 | 1.000 | A BB | 31902. | 20.000 NG/UL | 3.20 |
| 2 | 136 | 982 | 12:24 | 2 | 1.000 | A BB | 118660. | 20.000 NG/UL | 3.20 |
| 3 | 164 | 1343 | 16:57 | 3 | 1.000 | A BB | 64368. | 20.000 NG/UL | 3.20 |
| 4 | 188 | 1648 | 20:48 | 4 | 1.000 | A BV | 89210. | 20.000 NG/UL | 3.20 |
| 5 | 240 | 2177 | 27:29 | 5 | 1.000 | A BB | 59878. | 20.000 NG/UL | 3.20 |
| 6 | 264 | 2595 | 32:46 | 6 | 1.000 | A BB | 33815. | 20.000 NG/UL | 3.20 |
| 7 | 112 | 526 | 6:38 | 1 | 0.712 | A BB | 138638. | 73.271 NG/UL | 11.72 |
| 8 | 99 | 674 | 8:31 | 1 | 0.912 | A BB | 176198. | 71.451 NG/UL | 11.43 |
| 9 | 330 | 1506 | 19:01 | 3 | 1.121 | A BB | 30518. | 64.871 NG/UL | 10.38 |
| 10 | 82 | 843 | 10:39 | 2 | 0.858 | A BB | 119966. | 46.995 NG/UL | 7.52 |
| 11 | 172 | 1204 | 15:12 | 3 | 0.897 | A BB | 163804. | 48.219 NG/UL | 7.71 |
| 12 | 244 | 1967 | 24:50 | 5 | 0.904 | A BB | 147059. | 53.202 NG/UL | 8.51 |
| 13 | 132 | 699 | 8:49 | 1 | 0.946 | A BB | 136248. | 72.544 NG/UL | 11.60 |
| 14 | 152 | 767 | 9:41 | 1 | 1.038 | A BB | 61326. | 47.666 NG/UL | 7.62 |
| ~~15~~ | ~~94~~ | ~~676~~ | ~~8:32~~ | ~~1~~ | ~~0.915~~ | ~~A BB~~ | ~~1110.~~ | ~~0.450 NG/UL~~ | ~~0.07~~ |
| 16 | NOT FOUND | | | | | | | | |
| 17 | NOT FOUND | | | | | | | | |
| 18 | NOT FOUND | | | | | | | | |
| 19 | NOT FOUND | | | | | | | | |
| ~~20~~ | ~~108~~ | ~~767~~ | ~~9:41~~ | ~~1~~ | ~~1.038~~ | ~~A BB~~ | ~~858.~~ | ~~0.541 NG/UL~~ | ~~0.09~~ |
| 21 | NOT FOUND | | | | | | | | |
| 22 | NOT FOUND | | | | | | | | |
| 23 | NOT FOUND | | | | | | | | |
| 24 | NOT FOUND | | | | | | | | |
| 25 | NOT FOUND | | | | | | | | |
| 26 | NOT FOUND | | | | | | | | |
| 27 | NOT FOUND | | | | | | | | |
| 28 | NOT FOUND | | | | | | | | |
| 29 | NOT FOUND | | | | | | | | |
| 30 | NOT FOUND | | | | | | | | |
| 31 | NOT FOUND | | | | | | | | |
| 32 | NOT FOUND | | | | | | | | |
| 33 | NOT FOUND | | | | | | | | |
| 34 | NOT FOUND | | | | | | | | |
| ~~35~~ | ~~128~~ | ~~986~~ | ~~12:27~~ | ~~2~~ | ~~1.004~~ | ~~A BB~~ | ~~592.~~ | ~~0.112 NG/UL~~ | ~~0.02~~ |
| 36 | NOT FOUND | | | | | | | | |
| 37 | NOT FOUND | | | | | | | | |
| 38 | NOT FOUND | | | | | | | | |
| 39 | NOT FOUND | | | | | | | | |
| 40 | NOT FOUND | | | | | | | | |
| 41 | NOT FOUND | | | | | | | | |
| 42 | NOT FOUND | | | | | | | | |
| 43 | NOT FOUND | | | | | | | | |
| 44 | NOT FOUND | | | | | | | | |
| 45 | NOT FOUND | | | | | | | | |
| 46 | NOT FOUND | | | | | | | | |
| 47 | NOT FOUND | | | | | | | | |
| 48 | NOT FOUND | | | | | | | | |
| 49 | NOT FOUND | | | | | | | | |
| 50 | NOT FOUND | | | | | | | | |

for cpc — for internal std. dil'n

$$\text{ug/kg phenol} = \frac{(1110)(20)(500)(2)(2)}{(31902)(1.548)(30.4)(2)}$$

ug/kg phenol = 14.8 = 15 ug/kg in Blank

15 ug/kg × 5 = 75 ug/kg — upper limit

07/29/93

3/3/94



9413225.1732

RADIOCHEMISTRY DATA VALIDATION SUMMARY FOR DATA PACKAGE:
B09332-TMA-611 (923-E418, B09332R.UP2)

9413225.1733

MEMORANDUM

TO: 200-UP-2 Project QA Record April 27, 1994

FR: Kent Angelos, Golder Associates Inc.

RE: RADIOCHEMISTRY DATA VALIDATION SUMMARY FOR DATA PACKAGE: B09332-TMA-611 (923-E418, B09332R.UP2)

## INTRODUCTION

This memo presents the results of data validation on data package B09332-TMA-611 prepared by the TMA/Norcal laboratory. A list of samples validated along with the analyses reported and methods of analysis is provided in the following table.

| SAMPLE ID | SAMPLE DATE | MEDIA | ANALYSIS |
|---|---|---|---|
| B09332 | 09/09/93 | SOIL | SEE NOTES |
| B09333 | 09/10/93 | SOIL | |
| B09336 | 09/10/93 | SOIL | |

Notes:

1. Samples were analyzed for gross alpha, gross beta, selenium 79, strontium 90, technetium 99, iodine 129, isotopic uranium, isotopic plutonium, total uranium, neptunium 237, americium 241, curium 244 and selected isotopes by gamma spectroscopy.

2. All samples were 100% validated.

Data validation was conducted in accordance with the WHC statement of work (WHC 1993a) and validation procedures (WHC 1993b). Attachments 1 through 5 provide the following information as indicated below:

Attachment 1. Glossary of Data Reporting Qualifiers
Attachment 2. Summary of Data Qualifications
Attachment 3. Qualified Data Summary and Annotated Laboratory Reports
Attachment 4. Laboratory Narrative and Chain-of-Custody Documentation
Attachment 5. Data Validation Supporting Documentation

## DATA QUALITY OBJECTIVES

This section presents a summary of the data quality in terms of the referenced validation criteria.

**Precision.** Goals for precision were met.

**Accuracy.** Goals for accuracy were met.

**Sample Result Verification.** All sample results were supported in the raw data. However, sample results for total uranium and minimum detectable activities for neptunium-237 and iodine-129 could not be verified accurately by recalculation. No qualification was applied since the sample results were supported in the raw data.

Revised 4/27/94



9413225.1734

**Detection Limits.** Detection limit goals were met for all sample results as specified in the laboratory statement of work, with the following exceptions due to matrix effects and insufficient sample volume. Attachment 4 provides supporting documentation.

| SAMPLE ID | ANALYTE | MINIMUM DETECTABLE ACTIVITY REPORTED (pCi/g) | REQUIRED DETECTION LIMIT (pCi/g) |
|---|---|---|---|
| B09332 | Iron 59 | 0.1 | 0.05 |
| B09333 | Selenium 79 | 20 | 10 |
| | Iron 59 | 0.2 | 0.05 |
| | Cobalt 58 | 0.06 | 0.05 |
| | Cobalt 60 | 0.06 | 0.05 |
| | Europium 155 | 0.2 | 0.1 |
| B09336 | Selenium 79 | 40 | 10 |
| | Iron 59 | 0.1 | 0.05 |

**Completeness.** The data package was complete for all requested analyses. Three samples were validated in this data package with a total of 105 determinations reported, of which all were deemed valid. This results in a completeness of 100 percent, which meets the work plan data quality objectives of 90%.

9413225.1735

## MAJOR DEFICIENCIES

No major deficiencies were identified which required qualification of results as unusable.

## MINOR DEFICIENCIES

The following minor deficiencies were identified which required qualification of results as estimated.

### Laboratory Blanks

- Gross beta was reported in the reagent blank therefore all sample results have been qualified as estimated (J).
- The reagent blank for gross alpha and gross beta analyses was performed several days after the associated samples. Therefore, all gross alpha and gross beta sample results have been qualified as estimated (J).

## REFERENCES

WHC 1993a, Validation of 200-UP-2 Data, Statement of Work, Analytical Laboratory Data Validation, Task Order S-94-18, December 14, 1993, Purchase Order M073750. Westinghouse Hanford Company, Richland, Washington.

WHC, 1993b, Data Validation Procedures for Radiochemical Analyses, WHC-SD-EN-SPP-001, Rev. 1. December 1993. Westinghouse Hanford Company, Richland, Washington.

Revised
4/27/94

ATTACHMENT 1

GLOSSARY OF DATA REPORTING QUALIFIERS

U - Indicates the constituent was analyzed for, but was not detected at a concentration above the minimum detectable activity (MDA). The concentration reported is the MDA corrected for sample aliquot size, dilution factors and percent solids (in the case of solid matrices) by the laboratory. The associated data should be considered usable for decision making purposes.

UJ - Indicates the constituent was analyzed for and was not detected at a concentration above the MDA. Due to a quality control deficiency identified during data validation, the concentration reported may not accurately reflect the sample MDA. The associated data should be considered usable for decision making purposes.

J - Indicates the constituent was analyzed for and detected. The concentration reported is qualified as estimated due to a quality control deficiency identified during data validation. The associated data should be considered usable for decision making purposes.

UR - Indicates the constituent was analyzed for and not detected. The concentration reported is qualified as unusable due to a quality control deficiency identified during data validation. The associated data should be considered unusable for decision making purposes.

R - Indicates the constituent was analyzed for and detected. The concentration reported is qualified as unusable due to a quality control deficiency identified during data validation. The associated data should be considered unusable for decision making purposes.

9413225.1736

ATTACHMENT 2

SUMMARY OF DATA QUALIFICATIONS

9413225.1737

# DATA QUALIFICATION SUMMARY - FORM B7

| SDG: B09332-TMA-611 | Validator: K. Angelos | Date: April 27, 1994 | Page 1 OF 1 |
|---|---|---|---|
| Comments: Radiochemistry | | | |
| Compound/Analyte | Qualifier | Samples Affected | Reason |
| Gross Beta | J | All | Detected in reagent blank |
| Gross Beta | J | All | Associated reagent blank was analyzed several days after samples |
| Gross Alpha | J | All | Associated reagent blank was analyzed several days after samples |

9H3225-1738

Revised 4/27/94

ATTACHMENT 3

QUALIFIED DATA SUMMARY AND
ANNOTATED LABORATORY REPORTS

914 3225 1739

9413225.1740

Validated Data Summary, Data Package: B09332-TMA-611

| | Samp# | B09332 | | B09333 | | B09336 | |
|---|---|---|---|---|---|---|---|
| | Date | 9-9-93 | | 9-10-93 | | 9-10-93 | |
| | Location | 299-W19-95 | | 299-W19-97 | | 299-W19-95 | |
| | Depth | 60.00 - 62.50 | | 50.00 - 52.50 | | 74.80 - 77.30 | |
| | Type | --- | | --- | | --- | |
| | Comments | --- | | --- | | --- | |
| Parameter | Units | Result | Q | Result | Q | Result | Q |
| GROSS ALPHA | pCi/g | 4.500 | J | 3.600 | J | 4.000 | J |
| GROSS BETA | pCi/g | 14.000 | J | 12.000 | J | 16.000 | J |
| SELENIUM-79 | pCi/g | 5.000 | U | 20.000 | U | 40.000 | U |
| STRONTIUM-90 | pCi/g | 0.700 | U | 0.800 | U | 0.800 | U |
| TECHNETIUM-99 | pCi/g | 0.120 | | 0.210 | | 0.140 | |
| IODINE-129 | pCi/g | 0.300 | U | 1.000 | U | 2.000 | U |
| URANIUM-233/234 | pCi/g | 0.370 | | 0.230 | | 0.430 | |
| URANIUM-235 | pCi/g | 0.100 | U | 0.100 | U | 0.100 | U |
| URANIUM-238 | pCi/g | 0.230 | | 0.340 | | 0.590 | |
| TOTAL URANIUM | pCi/g | 1.100 | | 1.100 | | 1.200 | |
| NEPTUNIUM-237 | pCi/g | 0.040 | U | 0.030 | U | 0.011 | |
| PLUTONIUM-238 | pCi/g | 0.010 | U | 0.030 | U | 0.040 | U |
| PLUTONIUM-239/240 | pCi/g | 0.020 | U | 0.030 | U | 0.030 | U |
| AMERICIUM-241 | pCi/g | 0.020 | U | 0.010 | U | 0.010 | U |
| CURIUM-244 | pCi/g | 0.010 | U | 0.020 | U | 0.010 | U |
| SODIUM-22 | pCi/g | 0.050 | U | 0.070 | U | 0.050 | U |
| POTASSIUM-40 | pCi/g | 13.000 | | 14.000 | | 12.000 | |
| MANGANESE-54 | pCi/g | 0.040 | U | 0.060 | U | 0.030 | U |
| IRON-59 | pCi/g | 0.100 | U | 0.200 | U | 0.100 | U |
| COBALT-58 | pCi/g | 0.040 | U | 0.060 | U | 0.040 | U |
| COBALT-60 | pCi/g | 0.040 | U | 0.060 | U | 0.030 | U |
| NIOBIUM-94 | pCi/g | 0.040 | U | 0.040 | U | 0.030 | U |
| RUTHENIUM-103 | pCi/g | 0.050 | U | 0.060 | U | 0.040 | U |
| RUTHENIUM-106 | pCi/g | 0.300 | U | 0.400 | U | 0.300 | U |
| TIN-113 | pCi/g | 0.040 | U | 0.060 | U | 0.040 | U |
| CESIUM-134 | pCi/g | 0.050 | U | 0.070 | U | 0.040 | U |
| CESIUM-137 | pCi/g | 0.040 | U | 0.050 | U | 0.040 | U |
| CERIUM-144 | pCi/g | 0.200 | U | 0.300 | U | 0.200 | U |
| EUROPIUM-152 | pCi/g | 0.090 | U | 0.100 | U | 0.080 | U |
| EUROPIUM-154 | pCi/g | 0.060 | U | 0.070 | U | 0.050 | U |
| EUROPIUM-155 | pCi/g | 0.100 | U | 0.200 | U | 0.100 | U |
| RADIUM-226 | pCi/g | 0.380 | | 0.530 | | 0.430 | |
| RADIUM-228 | pCi/g | 0.700 | | 0.840 | | 0.560 | |
| THORIUM-228 | pCi/g | 0.640 | | 0.940 | | 0.730 | |
| THORIUM-232 | pCi/g | 0.700 | | 0.840 | | 0.560 | |

Revised [illegible] 4/27/94

Verified [illegible] 4/27/94

N309048-01

# TMA NORCAL
REPORTING GROUP 7241

# DATA SHEET

B09332

| | | | |
|---|---|---|---|
| SDG | 7241 | Client | Westinghouse Hanford |
| Contact | Dinkar Kharkar | Contract | MBH-SVV-069262 |
| Lab sample id | N309048-01 | Client sample id | B09332 |
| Dept sample id | 7241-001 | Location/Matrix | 200-UP-2 SOLID |
| Received | 09/14/93 | Collected | 09/09/93 |
| % moisture | 2.1 | Chain of custody id | EFL-1091 |

Q 4/27/94

9413225.1741

| ANALYTE | CAS NO | RESULT pCi/g | 2σ ERR (COUNT) | MDA pCi/g | RDL pCi/g | QUALIFIERS | TEST |
|---|---|---|---|---|---|---|---|
| Gross Alpha | Alpha | 4.5 | 3.7 | 4 | 10 | ~~J~~ J | 80A |
| Gross Beta | Beta | 14 | 4.1 | 5 | 10 | ~~B~~ J | 80B |
| Selenium 79 | 15758-45-9 | 1.8 | 2.1 | 5 | 10 | U | SE |
| Strontium 90 | 10098-97-2 | -0.058 | 0.89 | 0.7 | 1 | U | Y |
| Technetium 99 | 14133-76-7 | 0.12 | 0.053 | 0.1 | 0.5 | ~~J~~ | TC |
| Iodine 129 | 15046-84-1 | 0.20 | 0.14 | 0.3 | 2 | U | I |
| Uranium 233/234 | | 0.37 | 0.14 | 0.1 | 0.3 | | U |
| Uranium 235 | 15117-96-1 | 0.016 | 0.033 | 0.1 | 0.3 | U | U |
| Uranium 238 | | 0.23 | 0.11 | 0.1 | 0.3 | ~~J~~ | U |
| Total Uranium (ug/g) | 7440-61-1 | 1.1 | 0.20 | 0.03 | 0.1 | ~~X~~ | U_T |
| Neptunium 237 | 13994-20-2 | 0.034 | 0.030 | 0.04 | 0.2 | U | NP |
| Plutonium 238 | 13981-16-3 | -0.002 | 0.004 | 0.01 | 0.05 | U | PU |
| Plutonium 239/240 | | -0.002 | 0.008 | 0.02 | 0.05 | U | PU |
| Americium 241 | 14596-10-2 | 0.002 | 0.010 | 0.02 | 0.05 | U | TP |
| Curium 244 | 13981-15-2 | 0 | 0.007 | 0.01 | 0.05 | U | TP |
| GAMMA SCAN ANALYTES | | | | | | | |
| Sodium 22 | 13966-32-0 | U | | 0.05 | | U | GAM |
| Potassium 40 | 13966-00-2 | 13 | 0.93 | | | | GAM |
| Manganese 54 | 13966-31-9 | U | | 0.04 | | U | GAM |
| Iron 59 | 14596-12-4 | U | | 0.1 | 0.05 | U | GAM |
| Cobalt 58 | 13981-38-9 | U | | 0.04 | 0.05 | U | GAM |
| Cobalt 60 | 10198-40-0 | U | | 0.04 | 0.05 | U | GAM |
| Niobium 94 | 14681-63-1 | U | | 0.04 | | U | GAM |
| Ruthenium 103 | 13968-53-1 | U | | 0.05 | | U | GAM |
| Ruthenium 106 | 13967-48-1 | U | | 0.3 | | U | GAM |
| Tin 113 | 13966-06-8 | U | | 0.04 | | U | GAM |
| Cesium 134 | 13967-70-9 | U | | 0.05 | | U | GAM |
| Cesium 137 | 10045-97-3 | U | | 0.04 | 0.05 | U | GAM |

Revised 4/27/94

Verified 3/14/94

| | |
|---|---|
| Lab id | TMAN |
| Protocol | WHC-HASM |
| Version | Ver 1.0 |
| Form | DVD-DS |
| Version | 2.27 |
| Report date | 12/21/93 |

TMA NORCAL
REPORTING GROUP 7241

N309048-01

DATA SHEET, cont

B09332

| | | | |
|---|---|---|---|
| SDG | 7241 | Client | Westinghouse Hanford |
| Contact | Dinkar Kharkar | Contract | MBH-SVV-069262 |
| Lab sample id | N309048-01 | Client sample id | B09332 |
| Dept sample id | 7241-001 | Location/Matrix | 200-UP-2 SOLID |
| Received | 09/14/93 | Collected | 09/09/93 |
| % moisture | 2.1 | Chain of custody id | EFL-1091 |

9413225.1742

| ANALYTE | CAS NO | RESULT pCi/g | 2σ ERR (COUNT) | MDA pCi/g | RDL pCi/g | QUALI-FIERS | TEST |
|---|---|---|---|---|---|---|---|
| Cerium 144 | 14762-78-8 | U | | 0.2 | | U | GAM |
| Europium 152 | 14683-23-9 | U | | 0.09 | 0.1 | U | GAM |
| Europium 154 | 15585-10-1 | U | | 0.06 | 0.1 | U | GAM |
| Europium 155 | 14391-16-3 | U | | 0.1 | 0.1 | U | GAM |
| Radium 226 | 13982-63-3 | 0.38 | 0.084 | | | | GAM |
| Radium 228 | 15262-20-1 | 0.70 | 0.15 | | | | GAM |
| Thorium 228 | 14274-82-9 | 0.64 | 0.053 | | | | GAM |
| Thorium 232 | 7440-29-1 | 0.70 | 0.15 | | | | GAM |

| LAB SAMPLE | TEST | PLANCHET | SUFFIX | ALIQUOT | ANALYZED | REVIEWED | BY |
|---|---|---|---|---|---|---|---|
| N309048-01 | 80A/80 | 7241-001 | | 0.100 g | 10/13/93 | 10/15/93 | DPK |
| N309048-01 | 80B/80 | 7241-001 | | 0.100 g | 10/13/93 | 10/15/93 | DPK |
| N309048-01 | SE | 7241-001 | | 0.540 g | 11/10/93 | 11/17/93 | DPK |
| N309048-01 | Y | 7241-001 | | 1.00 g | 10/13/93 | 10/18/93 | DPK |
| N309048-01 | TC | 7241-001 | | 2.02 g | 10/08/93 | 10/12/93 | DPK |
| N309048-01 | I | 7241-001 | | 1.00 g | 11/29/93 | 12/01/93 | DPK |
| N309048-01 | U | 7241-001 | | 1.00 g | 10/20/93 | 10/22/93 | DPK |
| N309048-01 | U_T | 7241-001 | | 0.250 g | 10/07/93 | 11/30/93 | DPK |
| N309048-01 | NP | 7241-001 | | 1.00 g | 10/21/93 | 10/27/93 | DPK |
| N309048-01 | PU | 7241-001 | | 1.00 g | 10/18/93 | 10/20/93 | DPK |
| N309048-01 | TP | 7241-001 | A2 | 1.00 g | 12/15/93 | 12/16/93 | DPK |
| N309048-01 | GAM | 7241-001 | | 880 g | 09/29/93 | 09/30/93 | DPK |



Verified 3/14/94

| | |
|---|---|
| Lab id | TMAN |
| Protocol | WHC-HASM |
| Version | Ver 1.0 |
| Form | DVD-DS |
| Version | 2.27 |
| Report date | 12/21/93 |

N309048-02

# TMA NORCAL
REPORTING GROUP 7241

## DATA SHEET

B09333

| | | | |
|---|---|---|---|
| SDG | 7241 | Client | Westinghouse Hanford |
| Contact | Dinkar Kharkar | Contract | MBH-SVV-069262 |
| Lab sample id | N309048-02 | Client sample id | B09333 |
| Dept sample id | 7241-002 | Location/Matrix | 200-UP-2 SOLID |
| Received | 09/14/93 | Collected | 09/10/93 |
| % moisture | 19.5 | Chain of custody id | EFL-1091 |

9413225.1743

| ANALYTE | CAS NO | RESULT pCi/g | 2σ ERR (COUNT) | MDA pCi/g | RDL pCi/g | QUALIFIERS | TEST |
|---|---|---|---|---|---|---|---|
| Gross Alpha | Alpha | 3.6 | 2.9 | 3 | 10 | ~~J~~ J | 80A |
| Gross Beta | Beta | 12 | 3.8 | 5 | 10 | ~~B~~ J | 80B |
| Selenium 79 | 15758-45-9 | -9.0 | 11 | 20 | 10 | U | SE |
| Strontium 90 | 10098-97-2 | 0.11 | 0.24 | 0.8 | 1 | U | Y |
| Technetium 99 | 14133-76-7 | 0.21 | 0.078 | 0.1 | 0.5 | ~~J~~ | TC |
| Iodine 129 | 15046-84-1 | 0.070 | 0.65 | 1 | 2 | U | I |
| Uranium 233/234 | | 0.23 | 0.13 | 0.1 | 0.3 | ~~J~~ | U |
| Uranium 235 | 15117-96-1 | 0.046 | 0.062 | 0.1 | 0.3 | U | U |
| Uranium 238 | | 0.34 | 0.13 | 0.1 | 0.3 | | U |
| Total Uranium (ug/g) | 7440-61-1 | 1.1 | 0.20 | 0.03 | 0.1 | ~~X~~ | U_T |
| Neptunium 237 | 13994-20-2 | -0.003 | 0.013 | 0.03 | 0.2 | U | NP |
| Plutonium 238 | 13981-16-3 | 0.004 | 0.009 | 0.03 | 0.05 | U | PU |
| Plutonium 239/240 | | -0.004 | 0.009 | 0.03 | 0.05 | U | PU |
| Americium 241 | 14596-10-2 | 0.003 | 0.009 | 0.01 | 0.05 | U | TP |
| Curium 244 | 13981-15-2 | 0.001 | 0.009 | 0.02 | 0.05 | U | TP |
| GAMMA SCAN ANALYTES | | | | | | | |
| Sodium 22 | 13966-32-0 | U | | 0.07 | | U | GAM |
| Potassium 40 | 13966-00-2 | 14 | 1.1 | | | | GAM |
| Manganese 54 | 13966-31-9 | U | | 0.06 | | U | GAM |
| Iron 59 | 14596-12-4 | U | | 0.2 | 0.05 | U | GAM |
| Cobalt 58 | 13981-38-9 | U | | 0.06 | 0.05 | U | GAM |
| Cobalt 60 | 10198-40-0 | U | | 0.06 | 0.05 | U | GAM |
| Niobium 94 | 14681-63-1 | U | | 0.04 | | U | GAM |
| Ruthenium 103 | 13968-53-1 | U | | 0.06 | | U | GAM |
| Ruthenium 106 | 13967-48-1 | U | | 0.4 | | U | GAM |
| Tin 113 | 13966-06-8 | U | | 0.06 | | U | GAM |
| Cesium 134 | 13967-70-9 | U | | 0.07 | | U | GAM |
| Cesium 137 | 10045-97-3 | U | | 0.05 | 0.05 | U | GAM |

Revised 4/27/94

Verified 3/14/94

| | |
|---|---|
| Lab id | TMAN |
| Protocol | WHC-HASM |
| Version | Ver 1.0 |
| Form | DVD-DS |
| Version | 2.27 |
| Report date | 12/21/93 |

DATA SHEETS
Page 3
SUMMARY DATA SECTION
Page 21

N309048-02

# TMA NORCAL
REPORTING GROUP 7241

## DATA SHEET, cont

B09333

| | | | |
|---|---|---|---|
| SDG | 7241 | Client | Westinghouse Hanford |
| Contact | Dinkar Kharkar | Contract | MBH-SVV-069262 |
| Lab sample id | N309048-02 | Client sample id | B09333 |
| Dept sample id | 7241-002 | Location/Matrix | 200-UP-2 SOLID |
| Received | 09/14/93 | Collected | 09/10/93 |
| % moisture | 19.5 | Chain of custody id | EFL-1091 |

9413225.1744

| ANALYTE | CAS NO | RESULT pCi/g | 2σ ERR (COUNT) | MDA pCi/g | RDL pCi/g | QUALI-FIERS | TEST |
|---|---|---|---|---|---|---|---|
| Cerium 144 | 14762-78-8 | U | | 0.3 | | U | GAM |
| Europium 152 | 14683-23-9 | U | | 0.1 | 0.1 | U | GAM |
| Europium 154 | 15585-10-1 | U | | 0.07 | 0.1 | U | GAM |
| Europium 155 | 14391-16-3 | U | | 0.2 | 0.1 | U | GAM |
| Radium 226 | 13982-63-3 | 0.53 | 0.11 | | | | GAM |
| Radium 228 | 15262-20-1 | 0.84 | 0.25 | | | | GAM |
| Thorium 228 | 14274-82-9 | 0.94 | 0.068 | | | | GAM |
| Thorium 232 | 7440-29-1 | 0.84 | 0.25 | | | | GAM |

| LAB SAMPLE | TEST | PLANCHET | SUFFIX | ALIQUOT | ANALYZED | REVIEWED | BY |
|---|---|---|---|---|---|---|---|
| N309048-02 | 80A/80 | 7241-002 | | 0.100 g | 10/13/93 | 10/15/93 | DPK |
| N309048-02 | 80B/80 | 7241-002 | | 0.100 g | 10/13/93 | 10/15/93 | DPK |
| N309048-02 | SE | 7241-002 | | 0.530 g | 11/10/93 | 11/17/93 | DPK |
| N309048-02 | Y | 7241-002 | | 1.00 g | 10/13/93 | 10/18/93 | DPK |
| N309048-02 | TC | 7241-002 | | 2.00 g | 10/08/93 | 10/13/93 | DPK |
| N309048-02 | I | 7241-002 | | 1.00 g | 10/29/93 | 11/02/93 | DPK |
| N309048-02 | U | 7241-002 | | 1.00 g | 10/20/93 | 10/22/93 | DPK |
| N309048-02 | U_T | 7241-002 | | 0.250 g | 10/07/93 | 11/30/93 | DPK |
| N309048-02 | NP | 7241-002 | | 1.00 g | 10/21/93 | 10/28/93 | DPK |
| N309048-02 | PU | 7241-002 | | 1.00 g | 10/14/93 | 10/18/93 | DPK |
| N309048-02 | TP | 7241-002 | A2 | 1.00 g | 12/15/93 | 12/16/93 | DPK |
| N309048-02 | GAM | 7241-002 | | 658 g | 09/29/93 | 09/30/93 | DPK |

Verified [illegible] 3/14/94

| | |
|---|---|
| Lab id | TMAN |
| Protocol | WHC-HASM |
| Version | Ver 1.0 |
| Form | DVD-DS |
| Version | 2.27 |
| Report date | 12/21/93 |

N309048-03

# TMA NORCAL
REPORTING GROUP 7241

## DATA SHEET

B09336

| | | | |
|---|---|---|---|
| SDG | 7241 | Client | Westinghouse Hanford |
| Contact | Dinkar Kharkar | Contract | MBH-SVV-069262 |
| Lab sample id | N309048-03 | Client sample id | B09336 |
| Dept sample id | 7241-003 | Location/Matrix | 200-UP-2 SOLID |
| Received | 09/14/93 | Collected | 09/10/93 |
| % moisture | 3.0 | Chain of custody id | EFL-1091 |

Q 4/27/94

| ANALYTE | CAS NO | RESULT pCi/g | 2σ ERR (COUNT) | MDA pCi/g | RDL pCi/g | QUALIFIERS | TEST |
|---|---|---|---|---|---|---|---|
| Gross Alpha | Alpha | 4.0 | 3.2 | 3 | 10 | ~~J~~ J | 80A |
| Gross Beta | Beta | 16 | 4.1 | 5 | 10 | ~~B~~ J | 80B |
| Selenium 79 | 15758-45-9 | -28 | 22 | 40 | 10 | U | SE |
| Strontium 90 | 10098-97-2 | -0.042 | 0.74 | 0.8 | 1 | U | Y |
| Technetium 99 | 14133-76-7 | 0.14 | 0.063 | 0.1 | 0.5 | ~~J~~ | TC |
| Iodine 129 | 15046-84-1 | 0.075 | 0.93 | 2 | 2 | U | I |
| Uranium 233/234 | | 0.43 | 0.17 | 0.1 | 0.3 | | U |
| Uranium 235 | 15117-96-1 | 0 | 0.034 | 0.1 | 0.3 | U | U |
| Uranium 238 | | 0.59 | 0.18 | 0.1 | 0.3 | | U |
| Total Uranium (ug/g) | 7440-61-1 | 1.2 | 0.21 | 0.03 | 0.1 | ~~X~~ | U_T |
| Neptunium 237 | 13994-20-2 | 0.011 | 0.015 | 0.01 | 0.2 | ~~J~~ | NP |
| Plutonium 238 | 13981-16-3 | -0.008 | 0.008 | 0.04 | 0.05 | U | PU |
| Plutonium 239/240 | | 0.008 | 0.016 | 0.03 | 0.05 | U | PU |
| Americium 241 | 14596-10-2 | -0.001 | 0.006 | 0.01 | 0.05 | U | TP |
| Curium 244 | 13981-15-2 | 0.004 | 0.006 | 0.01 | 0.05 | U | TP |
| GAMMA SCAN ANALYTES | | | | | | | |
| Sodium 22 | 13966-32-0 | U | | 0.05 | | U | GAM |
| Potassium 40 | 13966-00-2 | 12 | 0.79 | | | | GAM |
| Manganese 54 | 13966-31-9 | U | | 0.03 | | U | GAM |
| Iron 59 | 14596-12-4 | U | | 0.1 | 0.05 | U | GAM |
| Cobalt 58 | 13981-38-9 | U | | 0.04 | 0.05 | U | GAM |
| Cobalt 60 | 10198-40-0 | U | | 0.03 | 0.05 | U | GAM |
| Niobium 94 | 14681-63-1 | U | | 0.03 | | U | GAM |
| Ruthenium 103 | 13968-53-1 | U | | 0.04 | | U | GAM |
| Ruthenium 106 | 13967-48-1 | U | | 0.3 | | U | GAM |
| Tin 113 | 13966-06-8 | U | | 0.04 | | U | GAM |
| Cesium 134 | 13967-70-9 | U | | 0.04 | | U | GAM |
| Cesium 137 | 10045-97-3 | U | | 0.04 | 0.05 | U | GAM |

Verified 3/14/94

Revised 4/27/94

| | |
|---|---|
| Lab id | TMAN |
| Protocol | WHC-HASM |
| Version | Ver 1.0 |
| Form | DVD-DS |
| Version | 2.27 |
| Report date | 12/21/93 |



9413225.1745

N309048-03

# TMA NORCAL
REPORTING GROUP 7241

## DATA SHEET, cont

B09336

| | | | |
|---|---|---|---|
| SDG | 7241 | Client | Westinghouse Hanford |
| Contact | Dinkar Kharkar | Contract | MBH-SVV-069262 |
| Lab sample id | N309048-03 | Client sample id | B09336 |
| Dept sample id | 7241-003 | Location/Matrix | 200-UP-2 SOLID |
| Received | 09/14/93 | Collected | 09/10/93 |
| % moisture | 3.0 | Chain of custody id | EFL-1091 |

9413225.1746

| ANALYTE | CAS NO | RESULT pCi/g | 2σ ERR (COUNT) | MDA pCi/g | RDL pCi/g | QUALI-FIERS | TEST |
|---|---|---|---|---|---|---|---|
| Cerium 144 | 14762-78-8 | U | | 0.2 | | U | GAM |
| Europium 152 | 14683-23-9 | U | | 0.08 | 0.1 | U | GAM |
| Europium 154 | 15585-10-1 | U | | 0.05 | 0.1 | U | GAM |
| Europium 155 | 14391-16-3 | U | | 0.1 | 0.1 | U | GAM |
| Radium 226 | 13982-63-3 | 0.43 | 0.087 | | | | GAM |
| Radium 228 | 15262-20-1 | 0.56 | 0.19 | | | | GAM |
| Thorium 228 | 14274-82-9 | 0.73 | 0.067 | | | | GAM |
| Thorium 232 | 7440-29-1 | 0.56 | 0.19 | | | | GAM |

| LAB SAMPLE | TEST | PLANCHET | SUFFIX | ALIQUOT | ANALYZED | REVIEWED | BY |
|---|---|---|---|---|---|---|---|
| N309048-03 | 80A/80 | 7241-003 | | 0.100 g | 10/13/93 | 10/15/93 | DPK |
| N309048-03 | 80B/80 | 7241-003 | | 0.100 g | 10/13/93 | 10/15/93 | DPK |
| N309048-03 | SE | 7241-003 | | 0.550 g | 11/10/93 | 11/17/93 | DPK |
| N309048-03 | Y | 7241-003 | | 1.00 g | 10/13/93 | 10/18/93 | DPK |
| N309048-03 | TC | 7241-003 | | 2.03 g | 10/09/93 | 10/13/93 | DPK |
| N309048-03 | I | 7241-003 | | 1.00 g | 11/01/93 | 11/02/93 | DPK |
| N309048-03 | U | 7241-003 | | 1.00 g | 10/20/93 | 10/22/93 | DPK |
| N309048-03 | U_T | 7241-003 | | 0.250 g | 10/07/93 | 11/30/93 | DPK |
| N309048-03 | NP | 7241-003 | | 1.00 g | 10/21/93 | 10/27/93 | DPK |
| N309048-03 | PU | 7241-003 | | 1.00 g | 10/14/93 | 10/18/93 | DPK |
| N309048-03 | TP | 7241-003 | A2 | 1.00 g | 12/15/93 | 12/16/93 | DPK |
| N309048-03 | GAM | 7241-003 | | 1020 g | 09/29/93 | 09/30/93 | DPK |

Verified [illegible] 3/1/94

DATA SHEETS
Page 6
SUMMARY DATA SECTION
Page 24

| | |
|---|---|
| Lab id | TMAN |
| Protocol | WHC-HASM |
| Version | Ver 1.0 |
| Form | DVD-DS |
| Version | 2.27 |
| Report date | 12/21/93 |

ATTACHMENT 4

LABORATORY NARRATIVE AND
CHAIN-OF-CUSTODY DOCUMENTATION

944325.1747

SDG: 7241
Contact: Dinkar Kharkar

# TMA NORCAL

REPORTING GROUP 7241

Client: Westinghouse Hanford
Contract: MBH-SVV-069262

## CASE NARRATIVE

### 1.0 GENERAL

TMA/Norcal Sample Delivery Group 7241 is comprised of the samples listed on the chain-of-custody documents below. This sample group was processed under the Westinghouse Hanford Company Statement of Work P.O. MBH-SVV-069262.

#### 1.1 Chains-of-Custody

This report includes data for the three soil samples from location 200-UP-2, SAF #93-263 delivered under Field Log Book #EFL-1091. Chain-of-Custody numbers were not provided.

#### 1.2 Sample Volume

One thousand mL plastic bottles containing the samples were received for the analyses. These were not adequate volumes to obtain the required detection limits for the gamma scan analysis.

#### 1.3 Missing Samples

All samples listed under Field Log Book #EFL-1091 were received.

#### 1.4 Holding Times

The samples were collected on September 9 and 10, 1993 and sample processing was initiated within 180 days of collection.

### 2.0 QUALITY CONTROL

The internal quality control consisted of one sample each of a laboratory control sample, a blank, and a replicate. All original analyses were performed with QC samples 7241-04 through 7241-06. Americium-241 and curium-244 analyses were performed with QC samples 7241-09 through 7241-11.

The QC samples were prepared by the Quality Control Department. Copies of the QC notebook pages are included in this data package.

#### 2.1 Laboratory Control Samples

The LCS recovery for neptunium-237 which was 81%, which was below the 3 $\sigma$ total limits of (87 - 113)%, but within the protocol limits of (80-120)%. The LCS recoveries for all other nuclides were acceptable. The MDA's of the results for all analyses met the RDL's except for iodine-129 which was above the RDL due to the higher background of the detector in the region of interest.



9413225.1748

SDG: 7241
Contact: Dinkar Kharkar

# TMA NORCAL
REPORTING GROUP 7241

Client: Westinghouse Hanford
Contract: MBH-SVV-069262

## 2.0 QUALITY CONTROL (cont'd)

### 2.2 Reagent Blanks
The MDA's of the results for all analyses met the RDL's. The gross beta result for the blank with a nominal aliquot of 0.1 g, was 11 pCi/g this was slightly higher than the RDL.

### 2.3 Duplicates
Results were satisfactory for all duplicate analyses. The MDA's of gamma nuclides for the duplicate of sample BO9332 were higher than the RDL's due to the smaller than nominal aliquots available for analysis. The MDA of iron-59 for the original of sample BO9332 was higher than the RDL due to the short half-life of iron-59.

9413225.1749

## 3.0 ANALYSIS NOTES

### 3.1 Gross Alpha Analyses
The average MDA for gross alpha was (4 ± 2) pCi/g. Gross alpha activity above the RDL was not found in any of the samples.

### 3.2 Gross Beta Analyses
The average MDA for gross beta was (5 ± 0.8) pCi/g. Gross beta activity above the RDL was found in all of the samples.

### 3.3 Selenium-79 Analyses
The average yield for five analyses was (82 ± 16)%. The lowest yield was 76% and the highest was 93%. The average MDA was (20 ± 30) pCi/g. Selenium-79 activity above the RDL was not found in any of the samples. The MDA's for samples BO9333 and BO9336 were higher than the RDL due to quenching, resulting in lower scintillation efficiency.

### 3.4 Strontium-90 Analyses
The average yield for six analyses was (84 ± 5)%. The lowest yield was 81% and the highest was 86%. The average MDA was (0.8 ± 0.1) pCi/g. Strontium-90 activity above the RDL was not found in any of the samples.

### 3.5 Technetium-99 Analyses
The average yield for six analyses was (63 ± 11)%. The lowest yield was 55% and the highest was 68%. The average MDA was (0.2 ± 0.2) pCi/g. Technetium-99 activity above the RDL was not found in any of the samples.

SDG: 7241
Contact: Dinkar Kharkar

# TMA NORCAL
REPORTING GROUP 7241

Client: Westinghouse Hanford
Contract: MBH-SVV-069262

## 3.0 ANALYSIS NOTES (cont'd)

### 3.6 Iodine-129 Analyses

The average yield for nine analyses was (72 ± 17)%. The lowest yield was 68% and the highest was 76%. The average MDA was (2 ± 2) pCi/g. Iodine-129 activity above the RDL was not found in any of the samples.

### 3.7 Isotopic Uranium Analyses

The average yield for six analyses was (68 ± 11)%. The lowest yield was 59% and the highest was 75%. The average MDA was (0.1 ± 0) pCi/g. Uranium-233/234 activity above the RDL was found in samples BO9332 and BO9336. Uranium-238 activity above the RDL was found in samples BO9333 and BO9336.

### 3.8 Total Uranium Analyses

The average MDA was (0.3 ± 0.3) μg/g. Uranium concentrations ranging from (1.1 to 1.2) μg/g were found in the samples.

### 3.9 Isotopic Plutonium Analyses

The average yield for six analyses was (41 ± 25)%. The lowest yield was 28% and the highest was 60%. The average MDA was (0.03 ± 0.02) pCi/g. Plutonium-238 and plutonium-239/240 activity above the RDL was not found in any of the samples.

### 3.10 Neptunium-237 Analyses

The average yield for six analyses was (38 ± 15)%. The lowest yield was 31% and the highest yield was 52%. The average MDA was (0.02 ± 0.02) pCi/g.. Neptunium-237 activity above the RDL was not found in any of the samples.

### 3.11 Americium-241/Curium-244 Analyses

The average yield for six analyses was (83 ± 13)%. The lowest yield was 74% and the highest yield was 93%. The average MDA was (0.01 ± 0.01) pCi/g. Americium-241 and curium-244 activity above the RDL was not found in any of the samples.

### 3.12 Gamma Scan Analyses

A gamma scan analysis found only natural potassium-40, radium-226, radium-228, thorium-228, and thorium-232 activities in the samples. The MDA of iron-59 in all samples was lower than the RDL due to the short half-life of iron-59. The MDA of cobalt-60 in sample BO9333 was higher than the RDL due to the small sample aliquot available for analyses.

9413225.1750

| Westinghouse Hanford Company | CHAIN OF CUSTODY |
|---|---|

Custody Form Initiator: L E ROGERS

Company Contact: L E ROGERS — Telephone: 376-7690

Project Designation/Sampling Locations: 200-UP-2 — Collection Date: 9-9-93

Ice Chest No.: SML 366 — Field Logbook No.: EFL-1091

Bill of Lading/Airbill No.: — Offsite Property No.:

Method of Shipment: OVERNIGHT AIR SERVICE

Shipped to: TMA

Possible Sample Hazards/Remarks: Keep samples at 4C (SOIL) NONE DETECTABLE

**Sample Identification**

1) B09332

1,250ml P:CLP;TAL Metals,Hg,Ti
~~1,250ml~~ 120ml Gs:VOA CLP
1,250ml nG:Semi-VOA CLP
1,125ml G:Anions F,Cl,SO4 (EPA 300.0)
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,125ml G:Cyanide CLP
1,125ml Gw:Kerosene (8015M)
1,1000ml P/G:Gross alpha/beta (EP-10), Gamma Spec to include,Cs-134,Cs-137,Co-60,Eu-152, Eu-154,Eu-155,K-40,Ru-106,Na-22 (RC-30), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5) Np-237,(RC-101A, RC-622, EP-5) Pu-238,Pu-239/240 (EP-80, EP-81, EP-5) I-129 (RC-25, RC-605) Sr-90 (RC-306, RC-303, RC-309, RC-304) Tc-99 (RC-24, RC-604) Am-241,Cm-244 (EP-80, EP-90, EP-91, EP-92, EP-93, EP-5) Se-79

9-10-93

2) ~~B09334~~ B09335

~~1,250ml P:CLP;TAL Metals,Hg,Ti~~
~~1,250ml~~ 120ml Gs:VOA CLP
~~1,250ml nG:Semi-VOA CLP~~
~~1,125ml G:Anions F,Cl,SO4 (EPA 300.0)~~
~~1,125ml P/G:Anions NO2,NO3 (EPA 353.2)~~
~~1,125ml G:Cyanide CLP~~
~~1,125ml Gw:Kerosene (8015M)~~
~~1,1000ml P/G:Gross alpha/beta (EP-10), Gamma Spec to include,Cs-134,Cs-137,Co-60,Eu-152, Eu-154,Eu-155,K-40,Ru-106,Na-22 (RC-30), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5) Np-237,(RC-101A, RC-622, EP-5) Pu-238,Pu-239/240 (EP-80, EP-81, EP-5) I-129 (RC-25, RC-605) Sr-90 (RC-306, RC-303, RC-309, RC-304) Tc-99 (RC-24, RC-604) Am-241,Cm-244 (EP-80, EP-90, EP-91, EP-92, EP-93, EP-5) Se-79~~

9-10-93

3)

1,250ml P:CLP;TAL Metals,Hg,Ti
~~1,250ml Gs:VOA CLP~~
1,250ml nG:Semi-VOA CLP
1,125ml G:Anions F,Cl,SO4 (EPA 300.0)
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,125ml G:Cyanide CLP
1,125ml Gw:Kerosene (8015M)
1,1000ml P/G:Gross alpha/beta (EP-10), Gamma Spec to include,Cs-134,Cs-137,Co-60,Eu-152, Eu-154,Eu-155,K-40,Ru-106,Na-22 (RC-30), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5) Np-237,(RC-101A, RC-622, EP-5) Pu-238,Pu-239/240 (EP-80, EP-81, EP-5) I-129 (RC-25, RC-605) Sr-90 (RC-306, RC-303, RC-309, RC-304) Tc-99 (RC-24, RC-604) Am-241,Cm-244 (EP-80, EP-90, EP-91, EP-92, EP-93, EP-5) Se-79

[] Field Transfer of Custody — Chain of Possession — (Sign and Print Names)

| Relinquished by: | Received by: | Date/Time: |
|---|---|---|
| 1040 Leon E. Rogers 9-10-93 | Roy T. Sichle | 1040 9-10-93 |
| Roy T. Sichle 1054 9-10-93 | H. Narciso | 9-14-93 10:50 |
| | | |
| | | |

**Final Sample Disposition**

| Disposal Method: | Disposed by: | Date/Time: |
|---|---|---|
| | | |

Comments:

A-6000-407 (12/90) (EF) WEF061
Chain of Custody

72

Westinghouse Hanford Company

# CHAIN OF CUSTODY

Custody Form Initiator: L E ROGERS

Company Contact: L E ROGERS

Telephone: 376-7690

Project Designation/Sampling Locations: 200-UP-2

Collection Date: 9-10-93

Ice Chest No.: SML 366

Field Logbook No.: EFL-1091

Bill of Lading/Airbill No.:

Offsite Property No.:

Method of Shipment: OVERNIGHT AIR SERVICE

Shipped to: TMA

Possible Sample Hazards/Remarks: Keep samples at 4C (SOIL) NONE DETECTED

Sample Identification

1) B09333

1,250ml P:CLP;TAL Metals,Hg,Ti
1,250ml Gs:VOA CLP
1,250ml aG:Semi-VOA CLP
1,125ml G:Anions F,Cl,SO4 (EPA 300.0)
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,125ml G:Cyanide CLP
1,125ml Gw:Kerosene (8015M)
1,1000ml P/G:Gross alpha/beta (EP-10), Gamma Spec to include,Cs-134,Cs-137,Co-60,Eu-152, Eu-154,Eu-155,K-40,Ru-106,Na-22 (RC-30), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5) Np-237,(RC-101A, RC-622, EP-5) Pu-238,Pu-239/240 (EP-80, EP-81, EP-5) I-129 (RC-25, RC-605) Sr-90 (RC-306, RC-303, RC-309, RC-304) Tc-99 (RC-24, RC-604) Am-241,Cm-244 (EP-80, EP-90, EP-91, EP-92, EP-93, EP-5) Se-79

2) B09336

1,250ml P:CLP;TAL Metals,Hg,Ti
~~1,250ml~~ 1,120ml Gs:VOA CLP
1,250ml aG:Semi-VOA CLP
1,125ml G:Anions F,Cl,SO4 (EPA 300.0)
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,125ml G:Cyanide CLP
1,125ml Gw:Kerosene (8015M)
1,1000ml P/G:Gross alpha/beta (EP-10), Gamma Spec to include,Cs-134,Cs-137,Co-60,Eu-152, Eu-154,Eu-155,K-40,Ru-106,Na-22 (RC-30), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5) Np-237,(RC-101A, RC-622, EP-5) Pu-238,Pu-239/240 (EP-80, EP-81, EP-5) I-129 (RC-25, RC-605) Sr-90 (RC-306, RC-303, RC-309, RC-304) Tc-99 (RC-24, RC-604) Am-241,Cm-244 (EP-80, EP-90, EP-91, EP-92, EP-93, EP-5) Se-79

ER 9-10-93

3)

1,250ml P:CLP;TAL Metals,Hg,Ti
1,250ml Gs:VOA CLP
1,250ml aG:Semi-VOA CLP
1,125ml G:Anions F,Cl,SO4 (EPA 300.0)
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,125ml G:Cyanide CLP
1,125ml Gw:Kerosene (8015M)
1,1000ml P/G:Gross alpha/beta (EP-10), Gamma Spec to include,Cs-134,Cs-137,Co-60,Eu-152, Eu-154,Eu-155,K-40,Ru-106,Na-22 (RC-30), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5) Np-237,(RC-101A, RC-622, EP-5) Pu-238,Pu-239/240 (EP-80, EP-81, EP-5) I-129 (RC-25, RC-605) Sr-90 (RC-306, RC-303, RC-309, RC-304) Tc-99 (RC-24, RC-604) Am-241,Cm-244 (EP-80, EP-90, EP-91, EP-92, EP-93, EP-5) Se-79

ER 9-10-93

[] Field Transfer of Custody — Chain of Possession (Sign and Print Names)

| Relinquished by: | Received by: | Date/Time: |
|---|---|---|
| 1040 Lorene E. Rogers 9-10-93 | Roy T Sickle | 9-10-93 1040 |
| Relinquished by: Roy T Sickle 1054 9-10-93 | Received by: H. Harris | Date/Time: 9-14-93 10:50 |
| Relinquished by: | Received by: | Date/Time: |
| Relinquished by: | Received by: | Date/Time: |

Final Sample Disposition

| Disposal Method: | Disposed by: | Date/Time: |
|---|---|---|

Comments:

A-6000-407 (12/90) (EF) WEF061
Chain of Custody

ATTACHMENT 5

DATA VALIDATION SUPPORTING DOCUMENTATION

9413225.1753

# RADIOCHEMICAL DATA VALIDATION CHECKLIST

| VALIDATION LEVEL: | A | B | C | D | E |
|---|---|---|---|---|---|

| | | | |
|---|---|---|---|
| PROJECT: 200-UP-2 | | DATA PACKAGE: B09332-TMA-611 | |
| VALIDATOR: L. Aurelio | LAB: TMA Westbay | | DATE: 3/14/94 |
| CASE: | | SDG: =241 | |

ANALYSES PERFORMED

| | | | | | |
|---|---|---|---|---|---|
| ☑ Gross Alpha/Beta | ☐ Strontium-90 | ☐ Technetium-99 | ☐ Alpha Spectroscopy U, Pu, Am-241, Np-237 | ☑ Gamma Spectroscopy | |
| ☑ Total Uranium | ☐ Radium-22 | ☐ Tritium | ☑ I-129 | Np-237 | |

SAMPLES/MATRIX B09332, B09336, B09333

1. Completeness . . . . . ☐ N/A

Technical verification forms present? . . . . . (Yes) No N/A

Comments: Technical verification completed by WHC

2. Initial Calibration . . . . . ☐ N/A

Instruments/detectors calibrated within one year of sample analysis? . . . . . Yes (No) N/A

Initial calibration acceptable? . . . . . (Yes) No N/A

Standards NIST traceable? . . . . . (Yes) No N/A

Standards Expired? . . . . . Yes (No) N/A

Comments: Certificates of Initial Calibration provided along with certificates for standards.





9413225.1754

3. Continuing Calibration . . . . . ☐ N/A

Calibration checked within one week of sample analysis? . . . (Yes) No N/A
Calibration check acceptable? . . . . . (Yes) No N/A
Calibration check standards NIST traceable? . . . . . (Yes) No N/A
Calibration check standards expired? . . . . . Yes (No) N/A

Comments: Control limits not provided for LBG used limits of 90 - 110

4. Blanks . . . . . ☐ N/A

Method blank analyzed? . . . . . (Yes) No N/A
Method blank results acceptable? . . . . . (Yes) No N/A
Analytes detected in method blank? . . . . . (Yes) No N/A
Field blank(s) analyzed? . . . . . Yes No (N/A)
Field blank results acceptable? . . . . . Yes No (N/A)
Analytes detected in field blank(s)? . . . . . Yes No (N/A)
Transcription/Calculation Errors? . . . . . Yes (No) N/A

Comments: Gross beta reported in reagent blank at 11 pCi/g, all sample results qualified as estimated (J).

4/27/94 Reagent blank for gross alpha & gross beta was analyzed several days after samples. Associated results have been qualified as estimated.

5. Matrix Spikes . . . . . ☑ N/A

Matrix spike analyzed? . . . . . Yes No (N/A)
Spike recoveries acceptable? . . . . . Yes No (N/A)
Spike source traceable? . . . . . Yes No (N/A)
Spike source expired? . . . . . Yes No (N/A)
Transcription/Calculation Errors? . . . . . Yes No (N/A)

Comments: LCS evaluated in lieu of matrix spike

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6. Laboratory Control Samples . . . . . ☐ N/A

LCS analyzed? . . . . . Yes No N/A
LCS recoveries acceptable? . . . . . Yes No N/A
LCS traceable? . . . . . Yes No N/A
Transcription/Calculation Errors? . . . . . Yes No N/A

Comments:_____

7. Chemical Recovery . . . . . ☐ N/A

Chemical carrier added? . . . . . Yes No N/A
Chemical recovery acceptable? . . . . . Yes No N/A
Chemical carrier traceable? . . . . . Yes No N/A
Chemical carrier expired? . . . . . Yes No N/A
Transcription/Calculation errors? . . . . . Yes No N/A

Comments:_____

8. Duplicates . . . . . ☐ N/A

Duplicates Analyzed? . . . . . Yes No N/A
RPD Values Acceptable? . . . . . Yes No N/A
Transcription/Calculation Errors? . . . . . Yes No N/A

Comments:_____

9413225.1756

9. Field QC Samples . . . . . ☒ N/A

Field duplicate sample(s) analyzed? . . . . . Yes No N/A
Field duplicate RPD values acceptable? . . . . . Yes No N/A
Field split sample(s) analyzed? . . . . . Yes No N/A
Field split RPD values acceptable? . . . . . Yes No N/A
Performance audit sample(s) analyzed? . . . . . Yes No N/A
Performance audit sample results acceptable? . . . . . Yes No N/A

Comments:

9M3225.1757

10. Holding Times

Are sample holding times acceptable? . . . . . Yes No N/A

Comments: All samples analyzed w/i 180 days of collection.

11. Results and Detection Limits (Levels D & E) . . . . . ☐ N/A

Results reported for all required sample analyses? . . . . . Yes No N/A
Results supported in raw data? . . . . . Yes No N/A
Results Acceptable? . . . . . Yes No N/A
Transcription/Calculation errors? . . . . . Yes No N/A
MDA's meet required detection limits? . . . . . Yes No N/A
Transcription/calculation errors? . . . . . Yes No N/A

Comments: MDA's exceeded RDLs as follows:

| Sample | Analyte | MDA | RDL | |
|---|---|---|---|---|
| B09332 | IRON-59 | 0.1 | 0.05 | |
| B09333 | Se79 | 20 | 10 | No qualification necessary |
| | Fe59 | 0.2 | 0.05 | |
| | Co58 | 0.06 | 0.05 | |
| | Co60 | 0.06 | 0.05 | |
| | Eu155 | 0.2 | 0.1 | |
| B09336 | Se79 | 40 | 10 | |
| | Fe59 | 0.1 | 0.05 | |

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Comments:

The laboratory reported "J", "B", and "X" qualifiers for samples B-9332, B-9333, and B-9336. These qualifiers have been crossed off the laboratory result forms for classification purposes and are not considered appropriate for radiochemistry validation.

[signature] 4/20/94

9413225.1758



Additional Page [signature] 4/20/94

-024A

TMA NORCAL
REPORTING GROUP 7241

N309048-05

# REAGENT BLANK

Reagent Blank

SDG 7241 Client Westinghouse Hanford
Contact Dinkar Kharkar Contract MDH-SVV-069262

Lab sample id N309048-05 Client sample id Reagent Blank
Dept sample id 7241-005 Material/Matrix SOLID

| ANALYTE | CAS NO | RESULT pCi/g | 2σ ERR (COUNT) | MDA pCi/g | RDL pCi/g | QUALIFIERS | TEST |
|---|---|---|---|---|---|---|---|
| Gross Alpha | Alpha | 0.27 | 3.3 | 5 | 10 | U | ROA |
| Gross Beta | Beta | 11 | 4.1 | 6 | 10 | | ROB |
| Selenium 79 | 15758-45-9 | 0.27 | 2.0 | 3 | 10 | U | SE |
| Strontium 90 | 10098-97-2 | 0.003 | 0.85 | 0.8 | 1 | U | Y |
| Technetium 99 | 14133-76-7 | 0.052 | 0.088 | 0.3 | 0.5 | U | TC |
| Iodine 129 | 15046-84-1 | -0.24 | 1.1 | 2 | 2 | U | I |
| Uranium 233/234 | | 0.015 | 0.060 | 0.1 | 0.3 | U | U |
| Uranium 235 | 15117-96-1 | 0 | 0.030 | 0.1 | 0.3 | U | U |
| Uranium 238 | | 0 | 0.030 | 0.1 | 0.3 | U | U |
| Total Uranium (ug/g) | 7440-61-1 | 0 | | 0.003 | 0.1 | UA | U_T |
| Neptunium 237 | 13994-20-2 | 0.005 | 0.014 | 0.03 | 0.2 | U | NP |
| Plutonium 238 | 13981-16-3 | 0.005 | 0.011 | 0.04 | 0.05 | U | PU |
| Plutonium 239/240 | | 0.005 | 0.011 | 0.04 | 0.05 | U | PU |
| GAMMA SCAN ANALYTES | | | | | | | |
| Sodium 22 | 13966-32-0 | U | | 0.02 | | U | GAM |
| Potassium 40 | 13966-00-2 | U | | 0.4 | | U | GAM |
| Manganese 54 | 13966-31-9 | U | | 0.02 | | U | GAM |
| Iron 59 | 14596-12-4 | U | | 0.04 | 0.05 | U | GAM |
| Cobalt 58 | 13981-38-9 | U | | 0.01 | 0.05 | U | GAM |
| Cobalt 60 | 10198-40-0 | U | | 0.02 | 0.05 | U | GAM |
| Niobium 94 | 14681-63-1 | U | | 0.02 | | U | GAM |
| Ruthenium 103 | 13968-53-1 | U | | 0.02 | | U | GAM |
| Ruthenium 106 | 13967-48-1 | U | | 0.2 | | U | GAM |
| Tin 113 | 13966-06-8 | U | | 0.02 | | U | GAM |
| Cesium 134 | 13967-70-9 | U | | 0.02 | | U | GAM |
| Cesium 137 | 10045-97-3 | U | | 0.02 | 0.05 | U | GAM |
| Cerium 144 | 14762-78-8 | U | | 0.09 | | U | GAM |
| Europium 152 | 14683-23-9 | U | | 0.04 | 0.1 | U | GAM |
| Europium 154 | 15585-10-1 | U | | 0.02 | 0.1 | U | GAM |
| Europium 155 | 14391-16-3 | U | | 0.06 | 0.1 | U | GAM |

Qualify beta as J

Revised

Lab id TMAN
Protocol WHC-HASM
Version Ver 1.0
Form DVD-DS
Version 2.27
Report date 12/21/93

Verified 3/21/94

4/29/94

REAGENT BLANKS
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SUMMARY DATA SECTION
Page 9



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N309048-05

# TMA NORCAL
REPORTING GROUP 7241

BLANK, cont.

Reagent Blank

| | | | |
|---|---|---|---|
| SDG | 7241 | Client | Westinghouse Hanford |
| Contact | Dinkar Kharkar | Contract | MBH-SVV-069262 |
| Lab sample id | N309048-05 | Client sample id | Reagent Blank |
| Dept sample id | 7241-005 | Material/Matrix | SOLID |

| ANALYTE | CAS NO | RESULT pCi/g | 2σ ERR (COUNT) | MDA pCi/g | RDL pCi/g | QUALI-FIERS | TEST |
|---|---|---|---|---|---|---|---|
| Radium 226 | 13982-63-3 | U | | 0.04 | | U | GAM |
| Radium 228 | 15262-20-1 | U | | 0.1 | | U | GAM |
| Thorium 228 | 14274-82-9 | U | | 0.02 | | U | GAM |
| Thorium 232 | 7440-29-1 | U | | 0.1 | | U | GAM |

9413225.1760

| LAB SAMPLE | TEST | PLANCHET | SUFFIX | ALIQUOT | ANALYZED | REVIEWED | BY |
|---|---|---|---|---|---|---|---|
| N309048-05 | 80A/80 | 7241-005 | | 0.100 g | 12/03/93 | ~~10/15/93~~ 12/06/93 | DPK |
| N309048-05 | 80B/80 | 7241-005 | | 0.100 g | 12/03/93 | ~~10/15/93~~ 12/06/93 | DPK |
| N309048-05 | SE | 7241-005 | | 0.500 g | 11/10/93 | 11/17/93 | DPK |
| N309048-05 | Y | 7241-005 | | 1.00 g | 10/13/93 | 10/18/93 | DPK |
| N309048-05 | TC | 7241-005 | | 2.00 g | 10/09/93 | 10/13/93 | DPK |
| N309048-05 | I | 7241-005 | | 1.00 g | 11/03/93 | 11/05/93 | DPK |
| N309048-05 | U | 7241-005 | | 1.00 g | 10/20/93 | 10/22/93 | DPK |
| N309048-05 | U_T | 7241-005 | | 0.250 g | 10/07/93 | 11/30/93 | DPK |
| N309048-05 | NP | 7241-005 | | 1.00 g | 10/21/93 | 10/27/93 | DPK |
| N309048-05 | PU | 7241-005 | | 1.00 g | 10/14/93 | 10/18/93 | DPK |
| N309048-05 | GAM | 7241-005 | | 750 g | 09/29/93 | 09/30/93 | DPK |

4/27/94

QC 15455 - 15464

Verified 3/21/94

Revised 4/27/94

| | |
|---|---|
| Lab id | TMAN |
| Protocol | WHC-HASM |
| Version | Ver 1.0 |
| Form | DVD-DS |
| Version | 2.27 |
| Report date | 12/21/93 |

REAGENT BLANKS
Page 2
SUMMARY DATA SECTION
Page 10

N309048-11

# TMA NORCAL
REPORTING GROUP 7241

## REAGENT BLANK

Reagent Blank

SDG 7241
Contact Dinkar Kharkar
Client Westinghouse Hanford
Contract MBH-SVV-069262

Lab sample id N309048-11
Dept sample id 7241-011
Client sample id Reagent Blank
Material/Matrix SOLID

| ANALYTE | CAS NO | RESULT pCi/g | 2σ ERR (COUNT) | MDA pCi/g | RDL pCi/g | QUALI-FIERS | TEST |
|---|---|---|---|---|---|---|---|
| Americium 241 | 14596-10-2 | 0.003 | 0.008 | 0.01 | 0.05 | U | TP |
| Curium 244 | 13981-15-2 | 0 | 0.005 | 0.01 | 0.05 | U | TP |

| LAB SAMPLE | TEST | PLANCHET | SUFFIX | ALIQUOT | ANALYZED | REVIEWED | BY |
|---|---|---|---|---|---|---|---|
| N309048-11 | TP | 7241-011 | | 1.00 g | 12/15/93 | 12/16/93 | DPK |

QC-16710

Verified MA 3/21/94

Lab id TMAN
Protocol WHC-HASM
Version Ver 1.0
Form DVD-DS
Version 2.27
Report date 12/21/93



9413225.1761

SAMPLE RESULT VERIFICATION, DATA PACKAGE: B09332-TMA-611

B09332-TMA-611
Gross Alpha/Beta

| Sample ID: | B09332 | B09333 | B09336 | QC-LCS | QC-BLANK | B09332-DUP |
|---|---|---|---|---|---|---|
| Aliquot: | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 |
| Detector: | 102 | 104 | 109 | 112 | 110 | 115 |
| Count time: | 100 | 100 | 100 | 100 | 100 | 100 |
| Alpha cpm: | 0.23 | 0.17 | 0.16 | 4.88 | 0.08 | 0.31 |
| Alpha, Bkgd: | 0.09 | 0.05 | 0.04 | 0.05 | 0.07 | 0.09 |
| Alpha, Xtalk: | 0.006 | 0.006 | 0.006 | 0.006 | 0.006 | 0.006 |
| Alpha, Eff: | 0.137 | 0.146 | 0.127 | 0.103 | 0.106 | 0.132 |
| Alpha Result Calc.: | 4.50 | 3.59 | 3.97 | 206.01 | 0.30 | 7.15 |
| Alpha Result Rptd.: | 4.49 | 3.58 | 3.99 | 206.00 | 0.27 | 7.11 |
| Alpha MDA Calc.: | 4.47 | 3.12 | 3.26 | 4.65 | 5.13 | 4.82 |
| Alpha MDA Rptd.: | 4.49 | 3.11 | 3.25 | 4.65 | 5.16 | 4.81 |
| Beta cpm: | 2.50 | 2.14 | 2.58 | 22.06 | 2.25 | 2.48 |
| Bkgd: | 1.13 | 1.02 | 1.04 | 1.10 | 1.25 | 0.99 |
| Xtalk: | 0.268 | 0.262 | 0.275 | 0.296 | 0.293 | 0.271 |
| Eff: | 0.42 | 0.42 | 0.42 | 0.41 | 0.41 | 0.42 |
| Beta Result Calc.: | 14.27 | 11.63 | 16.29 | 213.47 | 10.92 | 15.36 |
| Beta Result Rptd: | 14.30 | 11.70 | 16.30 | 214.00 | 10.90 | 15.40 |
| Beta MDA Calc: | 5.32 | 5.02 | 5.11 | 5.35 | 5.67 | 4.99 |
| Beta MDA rptd: | 5.31 | 5.02 | 5.11 | 5.35 | 5.67 | 4.98 |

Aliquot ~~for~~ QC-LCS and QC-BLANK have been corrected from 1.0 to 0.1 as according to the laboratory data.

4/27/94

Revised 4/27/94

SAMPLE RESULT VERIFICATION, DATA PACKAGE: B09332-TMA-611

Selenium 79

| Sample ID: | B09332 | B09333 | B09336 | QC-BLANK | B09332-DUP |
|---|---|---|---|---|---|
| Detector, LSC: | 5 | 5 | 5 | 5 | 5 |
| Count time: | 150 | 150 | 150 | 150 | 150 |
| Detector Eff: | 0.226 | 0.076 | 0.037 | 0.382 | 0.112 |
| Sample cpm: | 11.19 | 10.16 | 9.8 | 10.67 | 10.52 |
| Bkgd cpm: | 10.73 | 10.77 | 10.77 | 10.77 | 10.73 |
| Yield: | 0.9312 | 0.7711 | 0.7603 | 0.8718 | 0.7593 |
| Decay Corr: | 1 | 1 | 1 | 1 | 1 |
| Aliquot: | 0.54 | 0.53 | 0.55 | 0.5 | 0.54 |
| Result calc: | 1.82 | -8.85 | -28.24 | -0.27 | -2.06 |
| Result rptd: | 1.80 | -8.95 | -28.40 | -0.27 | -2.06 |
| MDA calc: | 4.94 | 18.11 | 36.35 | 3.38 | 12.23 |
| MDA rptd: | 4.99 | 18.40 | 36.97 | 3.42 | 12.36 |

Aliquot for QC-BLANK has been corrected from 1.0 to 0.5 as according to the laboratory data.

4/27/94

Revised 4/27/94

SAMPLE RESULT VERIFICATION, DATA PACKAGE: B09332-TMA-611

Strontium 90

| Sample ID: | B09332 | B09333 | B09336 | QC-LCS | QC-BLANK | B09332-DUP |
|---|---|---|---|---|---|---|
| Detector: | 205 | 206 | 207 | 208 | 209 | 210 |
| Bkg: | 0.3632 | 0.4500 | 0.4020 | 0.5485 | 0.4631 | 0.4201 |
| Count Time: | 33.000 | 33.000 | 33.000 | 33.000 | 33.000 | 33.000 |
| Y90 cpm: | -0.059 | 0.117 | -0.041 | 9.887 | 0.003 | -0.298 |
| Elapsed Time, days: | 33.441 | 32.441 | 32.441 | 0.000 | 0.000 | 33.441 |
| Lambda: | 6.86E-05 | 6.86E-05 | 6.86E-05 | 6.86E-05 | 6.86E-05 | 6.86E-05 |
| Decay: | 0.9977 | 0.9978 | 0.9978 | 1.0000 | 1.0000 | 0.9977 |
| Yield: | 0.8555 | 0.8555 | 0.8038 | 0.8138 | 0.8609 | 0.8138 |
| PPT. corr.: | 1 | 1 | 1 | 1 | 1 | 1 |
| Aliquot: | 1 | 1 | 1 | 1 | 1 | 1 |
| Product: | 0.8535 | 0.8536 | 0.8020 | 0.8138 | 0.8609 | 0.8119 |
| C-zero: | -0.0691 | 0.1371 | -0.0511 | 12.1492 | 0.0035 | -0.3670 |
| P-Factor: | 1.859 | 1.859 | 1.859 | 1.859 | 1.859 | 1.859 |
| Result, calc.: | -0.058 | 0.115 | -0.043 | 10.174 | 0.003 | -0.307 |
| Result, rptd.: | -0.058 | 0.114 | -0.042 | 10.173 | 0.003 | -0.259 |
| MDA, calc.: | 0.776 | 0.864 | 0.767 | 0.909 | 0.883 | 0.794 |
| MDA, rptd.: | 0.746 | 0.817 | 0.811 | 0.933 | 0.820 | 0.829 |

SAMPLE RESULT VERIFICATION, DATA PACKAGE: B09332-TMA-611

Technetium 99

| Sample ID: | B09332 | B09333 | B09336 | QC-LCS | QC-BLANK | B09332-DUP |
|---|---|---|---|---|---|---|
| Detector: | 13 | 14 | 11 | 12 | 15 | 11 |
| Net, cpm: | 0.150 | 0.280 | 0.180 | 14.760 | 0.060 | 0.070 |
| Days: | 29.985 | 28.985 | 29.003 | 0.000 | 0.000 | 30.618 |
| Lambda: | 8.91E-09 | 8.91E-09 | 8.91E-09 | 8.91E-09 | 8.91E-09 | 8.91E-09 |
| Decay: | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Yield: | 0.629 | 0.676 | 0.680 | 0.569 | 0.651 | 0.553 |
| Aliquot: | 2.020 | 2.000 | 2.000 | 2.000 | 2.000 | 2.040 |
| P-Factor: | 2.340 | 2.340 | 2.340 | 2.340 | 2.340 | 2.340 |
| Count, time: | 583.300 | 583.300 | 556.700 | 556.700 | 123.800 | 123.800 |
| Bkg., cpm: | 0.470 | 0.480 | 0.650 | 0.500 | 0.550 | 0.480 |
| Result, calc.: | 0.125 | 0.218 | 0.140 | 13.674 | 0.049 | 0.065 |
| Result, rptd.: | 0.125 | 0.215 | 0.139 | 13.671 | 0.052 | 0.064 |
| MDA, calc.: | 0.110 | 0.104 | 0.123 | 0.129 | 0.252 | 0.271 |
| MDA, rptd.: | 0.114 | 0.109 | 0.130 | 0.138 | 0.275 | 0.291 |

Aliquot has been corrected from 1.0 to 2.0 for QC-LCS and QC-BLANK as according to laboratory data.

[illegible] 4/27/94

Revised [illegible] 4/27/94

U031

SAMPLE RESULT VERIFICATION, DATA PACKAGE: B09332-TMA-611

Total Uranium

| Standard | Intensity | | | ug/L | ug/L | | Amount | Prep. | Calc | Rptd |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.049 | 574 | Sample ID | Intens. | Calc. | Rptd | Dilution | of Smpl | Volume | Result | Rslt |
| 0.156 | 1564 | B09332 | 13357 | 1.305 | 1.407 | 10 | 0.25 | 0.02 | 1.13 | 1.13 |
| 0.521 | 5160 | B09333 | 13132 | 1.283 | 1.364 | 10 | 0.25 | 0.02 | 1.09 | 1.09 |
| 0.976 | 10437 | B09336 | 13631 | 1.332 | 1.447 | 10 | 0.25 | 0.02 | 1.16 | 1.16 |
| 2.603 | 26611 | QC-LCS | 16046 | 1.568 | 1.506 | 10 | 0.25 | 0.02 | 1.20 | 1.20 |
| 4.881 | 49546 | QC-BLANK | -680 | -0.066 | 0.037 | 1 | 0.25 | 0.02 | 0.003 | 0.003 |
| 16.27 | 150595 | B09332-DUP | 11930 | 1.166 | 1.335 | 10 | 0.25 | 0.02 | 1.07 | 0.07 |

Slope: 9.8E-05

Calculation worksheet has been extended to include final calculated and reported result.

4/27/94

-032

Revised 4/27/94

SAMPLE RESULT VERIFICATION, DATA PACKAGE: B09332-TMA-611

Uranium 233/4/5/8

| Sample ID: | B09332 | B09333 | B09336 | QC-LCS | QC-BLANK | B09332-DUP |
|---|---|---|---|---|---|---|
| Detector: | 23 | 24 | 25 | 26 | 27 | 28 |
| Sample count time: | 152 | 152 | 152 | 933.93 | 193.28 | 193.28 |
| GMT count: | 293.790 | 293.790 | 293.790 | 293.790 | 293.790 | 293.790 |
| Zero time: | 252.292 | 252.292 | 252.292 | 252.292 | 252.292 | 252.292 |
| Corr. tracer dpm: | 10.49 | 10.49 | 10.49 | 10.48 | 10.49 | 10.49 |
| Bkgd count time: | 2610.45 | 2610.45 | 2610.45 | 2610.45 | 2610.82 | 2610.45 |
| Net tracer counts: | 348 | 372 | 337 | 2262 | 314 | 358 |
| Detector eff.: | 0.3112 | 0.3124 | 0.3097 | 0.3195 | 0.2625 | 0.267 |
| Yield: | 0.7016 | 0.7468 | 0.6824 | 0.7233 | 0.5900 | 0.6613 |
| U-238, gross counts: | 17 | 28 | 42 | 1847 | 0 | 37 |
| U-238, bkgd counts: | 0 | 1 | 0 | 119 | 0 | 0 |
| U-238, Lambda: | 4.23E-13 | 4.23E-13 | 4.23E-13 | 4.23E-13 | 4.23E-13 | 4.23E-13 |
| U-238, Decay corr: | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| U-235, gross counts: | 1 | 4 | 0 | 1146 | 0 | 5 |
| U-235, bkgd counts: | 0 | 1 | 0 | 5 | 0 | 1 |
| U-235, Lambda: | 2.67E-12 | 2.67E-12 | 2.67E-12 | 2.67E-12 | 2.67E-12 | 2.67E-12 |
| U-235, Decay corr: | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| U-235, branch ratio: | 0.826 | 0.826 | 0.826 | 0.826 | 0.826 | 0.826 |
| U-233/4, gross counts: | 29 | 21 | 32 | 1963 | 2 | 33 |
| U-233/4, bkgd counts: | 2 | 3 | 1 | 141 | 1 | 2 |
| U-233/4, Lambda: | 1.17E-08 | 1.17E-08 | 1.17E-08 | 1.17E-08 | 1.17E-08 | 1.17E-08 |
| U-233/4, Decay corr: | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Aliquot: | 1 | 1 | 1 | 1 | 1 | 1 |
| U-238, result calc.: | 0.231 | 0.343 | 0.589 | 3.606 | 0.000 | 0.488 |
| U-238, result rptd: | 0.230 | 0.340 | 0.590 | 3.600 | 0.000 | 0.490 |
| U-238 MDA calc.: | 0.104 | 0.097 | 0.108 | 0.106 | 0.115 | 0.101 |
| U-238, MDA rptd.: | 0.100 | 0.100 | 0.100 | 0.100 | 0.100 | 0.100 |
| U-235, result calc.: | 0.016 | 0.046 | 0.000 | 2.883 | 0.000 | 0.064 |
| U-235, result rptd.: | 0.016 | 0.046 | 0.000 | 2.900 | 0.000 | 0.064 |
| U-235, MDA calc.: | 0.126 | 0.118 | 0.130 | 0.026 | 0.140 | 0.123 |
| U-235, MDA rptd.: | 0.100 | 0.100 | 0.100 | 0.030 | 0.100 | 0.100 |
| U-233/4, result calc.: | 0.366 | 0.229 | 0.435 | 3.802 | 0.015 | 0.409 |
| U-233/4, result rptd.: | 0.370 | 0.230 | 0.430 | 3.800 | 0.015 | 0.410 |
| U-233/4, MDA calc.: | 0.104 | 0.103 | 0.108 | 0.115 | 0.115 | 0.101 |
| U-233/4, MDA rptd.: | 0.100 | 0.100 | 0.100 | 0.100 | 0.100 | 0.100 |

SAMPLE RESULT VERIFICATION, DATA PACKAGE: B09332-TMA-611

Plutonium 238/239

| Sample ID: | B09332 | B09333 | B09336 | QC-LCS | QC-BLANK | B09332-DUP |
|---|---|---|---|---|---|---|
| Detector: | 54 | 63 | 64 | 65 | 66 | 57 |
| Count time: | 1046.02 | 725.87 | 725.87 | 725.87 | 725.87 | 1046.02 |
| GMT, count: | 292.091 | 288.237 | 288.237 | 288.237 | 288.237 | 292.091 |
| Zero time: | 252.292 | 253.292 | 253.292 | 288.237 | 288.237 | 252.292 |
| Corr, tracer dpm: | 4.86 | 4.86 | 4.86 | 4.86 | 4.86 | 4.86 |
| Bkgd, count time: | 2739.25 | 2390.63 | 2390.63 | 2390.63 | 2390.63 | 2739.25 |
| Net, tracer counts: | 1145 | 494 | 554 | 461 | 407 | 962 |
| Detector Eff: | 0.3779 | 0.398 | 0.4048 | 0.4159 | 0.4137 | 0.3612 |
| Yield: | 0.5960 | 0.3518 | 0.3879 | 0.3142 | 0.2789 | 0.5239 |
| Pu239, gross counts: | 1 | 0 | 3 | 161 | 1 | 3 |
| Pu239, bkgd counts: | 2 | 1 | 1 | 1 | 0 | 0 |
| Pu-239, Lambda: | 7.78E-08 | 7.78E-08 | 7.78E-08 | 7.78E-08 | 7.78E-08 | 7.78E-08 |
| Pu239 decay: | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Pu238, gross counts: | 0 | 1 | 0 | 0 | 1 | 2 |
| Pu238, bkgd counts: | 1 | 0 | 2 | 0 | 0 | 2 |
| Pu-238, Lambda: | 2.20E-05 | 2.20E-05 | 2.20E-05 | 2.20E-05 | 2.20E-05 | 2.20E-05 |
| Pu238 decay: | 0.9991 | 0.9992 | 0.9992 | 1.0000 | 1.0000 | 0.9991 |
| Aliquot: | 1 | 1 | 1 | 1 | 1 | 1 |
| Pu239, Result calc.: | -0.002 | -0.004 | 0.008 | 0.760 | 0.005 | 0.007 |
| Pu239, Result rptd: | -0.002 | -0.004 | 0.008 | 0.760 | 0.005 | 0.007 |
| Pu239, MDA calc.: | 0.015 | 0.034 | 0.030 | 0.036 | 0.041 | 0.017 |
| Pu239, MDA rptd.: | 0.020 | 0.030 | 0.030 | 0.040 | 0.040 | 0.020 |
| Pu238, Result calc.: | -0.002 | 0.004 | -0.008 | 0.000 | 0.005 | 0.000 |
| Pu238, Result rptd.: | -0.002 | 0.004 | -0.008 | 0.000 | 0.005 | 0.000 |
| Pu238, MDA calc.: | 0.015 | 0.034 | 0.030 | 0.036 | 0.041 | 0.017 |
| Pu238, MDA rptd: | 0.010 | 0.030 | 0.030 | 0.040 | 0.040 | 0.020 |

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SAMPLE RESULT VERIFICATION, DATA PACKAGE: B09332-TMA-611

Americium/Curium

| Sample ID: | B09332 | B09333 | B09336 | QC-LCS | QC-BLANK | B09332-DUP |
|---|---|---|---|---|---|---|
| Detector: | 52 | 53 | 54 | 58 | 61 | 57 |
| Count Time: | 973.58 | 973.58 | 973.58 | 973.58 | 973.58 | 973.58 |
| GMT, count: | 350.100 | 350.100 | 350.100 | 350.100 | 350.100 | 350.100 |
| Zero time: | 252.292 | 252.292 | 252.292 | 350.100 | 350.100 | 252.292 |
| Tracer dpm: | 4.95 | 4.95 | 4.95 | 4.95 | 4.95 | 4.95 |
| Bkgd count time: | 2380.13 | 2380.13 | 2380.13 | 2380.13 | 2380.13 | 2380.13 |
| Net tracer counts: | 1376 | 1570 | 1533 | 1663 | 1711 | 1477 |
| Detector eff.: | 0.3835 | 0.3877 | 0.3782 | 0.3712 | 0.4181 | 0.3553 |
| Yield: | 0.7445 | 0.8403 | 0.8411 | 0.9296 | 0.8492 | 0.8626 |
| Aliquot: | 1 | 1 | 1 | 1 | 1 | 1 |
| Am241 gross counts: | 6 | 7 | 4 | 918 | 7 | 3 |
| Am241 bkgd. counts: | 5 | 5 | 5 | 5 | 5 | 4 |
| Am-241, Lambda: | 4.03E-06 | 4.03E-06 | 4.03E-06 | 4.03E-06 | 4.03E-06 | 4.03E-06 |
| Am241 decay: | 0.9996 | 0.9996 | 0.9996 | 1.0000 | 1.0000 | 0.9996 |
| Cm244 gross counts: | 2 | 6 | 5 | 546 | 3 | 0 |
| Cm244 bkgd counts: | 2 | 5 | 2 | 2 | 3 | 2 |
| Cm-244, Lambda: | 1.06E-04 | 1.06E-04 | 1.06E-04 | 1.06E-04 | 1.06E-04 | 1.06E-04 |
| Cm244 decay: | 0.9897 | 0.9897 | 0.9897 | 1.0000 | 1.0000 | 0.9897 |
| Am241 result calc.: | 0.002 | 0.003 | -0.001 | 1.224 | 0.003 | -0.002 |
| Am241 result rptd.: | 0.002 | 0.003 | -0.001 | 1.225 | 0.003 | -0.002 |
| Am241 MDA calc.: | 0.017 | 0.015 | 0.015 | 0.014 | 0.014 | 0.014 |
| Am241 MDA rptd: | 0.016 | 0.014 | 0.014 | 0.013 | 0.013 | 0.012 |
| Cm244 result calc.: | 0.000 | 0.001 | 0.004 | 0.729 | 0.000 | -0.003 |
| Cm244 result rptd: | 0.000 | 0.001 | 0.004 | 0.729 | 0.000 | -0.003 |
| Cm244 MDA calc.: | 0.013 | 0.015 | 0.011 | 0.010 | 0.011 | 0.012 |
| Cm244 MDA rptd.: | 0.013 | 0.018 | 0.011 | 0.010 | 0.013 | 0.012 |

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SAMPLE RESULT VERIFICATION, DATA PACKAGE: B09332-TMA-611

| Neptunium | | | | | | |
|---|---|---|---|---|---|---|
| Sample ID | B09332 | B09333 | B09336 | QC-LCS | QC-BLANK | B09332-DU |
| Detector: | 53 | 54 | 57 | 66 | 49 | 50 |
| Np239 cpm: | 21.92 | 26.39 | 24.83 | 23.18 | 36.98 | 27.58 |
| Inst. eff.: | 0.721 | 0.721 | 0.721 | 0.721 | 0.721 | 0.721 |
| Am243 added: | 99.08 | 99.08 | 99.08 | 99.08 | 99.08 | 99.08 |
| Yield: | 0.3068 | 0.3694 | 0.3476 | 0.3245 | 0.5177 | 0.3861 |
| Aliquot: | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| Count time: | 1020.87 | 1010.87 | 964.33 | 1054.18 | 993.1 | 993.1 |
| Np237 gross counts: | 12 | 1 | 3 | 789 | 5 | 5 |
| Np237 bkgd counts: | 3 | 2 | 0 | 0 | 3 | 1 |
| Np237 aspec. eff: | 0.386 | 0.378 | 0.367 | 0.413 | 0.364 | 0.355 |
| Np237 result calc.: | 0.034 | -0.003 | 0.011 | 2.516 | 0.005 | 0.013 |
| Np237 result rptd.: | 0.034 | -0.003 | 0.011 | 2.500 | 0.005 | 0.013 |
| Np237 MDA calc.: | 0.041 | 0.031 | 0.011 | 0.010 | 0.027 | 0.025 |
| Np237 MDA rptd.: | 0.040 | 0.030 | 0.011 | 0.010 | 0.027 | 0.025 |

Revised [illegible] 2/24/94

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SAMPLE RESULT VERIFICATION, DATA PACKAGE: B09332-TMA-611

| Iodine-129 | | | | | | |
|---|---|---|---|---|---|---|
| Sample ID: | B09332 | B09333 | B09336 | QC-LCS | QC-BLANK | B09332-DUP |
| Detector: | INGE1 | XSPEC14 | XSPEC14 | XSPEC15 | XSPEC14 | XSPEC14 |
| Count Time: | 203.9 | 465.33 | 899.68 | 401.85 | 788.93 | 1329.93 |
| Gross cpm: | 0.687 | 0.507 | 0.65 | 15.307 | 0.577 | 0.527 |
| Bkg cpm: | 0.787 | 0.508 | 0.779 | 0.909 | 0.806 | 0.59 |
| Std. Dev. for Bkg % Error: | 10.08 | 19.83 | 11 | 15.31 | 11.62 | 10.29 |
| Blank cpm: | -0.004 | -0.027 | -0.155 | -0.101 | -0.155 | -0.053 |
| Std. Dev. for Blank % Error: | 791.59 | 215.68 | 86.72 | 144.21 | 86.72 | 114.19 |
| Net cpm: | -0.096 | 0.026 | 0.026 | 14.499 | -0.074 | -0.010 |
| Lambda: | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Corr. Days: | 91.47 | 49.01 | 52.82 | 0.00 | 0.00 | 54.46 |
| Decay: | 1 | 1 | 1 | 1 | 1 | 1 |
| Yield: | 0.6924 | 0.7646 | 0.7613 | 0.6957 | 0.6834 | 0.7322 |
| Aliquot: | 1 | 1 | 1 | 1 | 1 | 1 |
| PPT. Corr.: | 1 | 1 | 1 | 1 | 1 | 1 |
| Product: | 6.92E-01 | 7.65E-01 | 7.61E-01 | 6.96E-01 | 6.83E-01 | 7.32E-01 |
| P-factor: | 1.00 | 4.57 | 4.87 | 4.87 | 4.87 | 4.57 |
| Result Calc.: | -0.062 | 0.070 | 0.075 | 45.719 | -0.238 | -0.028 |
| Result Rptd.: | -0.063 | 0.070 | 0.075 | 45.700 | -0.237 | -0.028 |
| MDA Calc.: | 0.267 | 1.472 | 2.145 | 2.975 | 2.456 | 1.126 |
| MDA Rptd.: | 0.268 | 1.475 | 2.147 | 2.977 | 2.457 | 1.122 |

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Revised 5/02/94

RADIOCHEMISTRY DATA VALIDATION SUMMARY FOR DATA PACKAGE:
B09332-TMA-611 (923-E418, Filename B09332R.UP2)

9413225.1772

MEMORANDUM

MAR 1994 RECEIVED TQD

TO: 200-UP-2 Project QA Record

March 23, 1994

FR: Kent Angelos, Golder Associates Inc.

RE: RADIOCHEMISTRY DATA VALIDATION SUMMARY FOR DATA PACKAGE: B09332-TMA-611 (923-E418, B09332R.UP2)

## INTRODUCTION

This memo presents the results of data validation on data package B09332-TMA-611 prepared by the TMA/Norcal laboratory. A list of samples validated along with the analyses reported and methods of analysis is provided in the following table.

| SAMPLE ID | SAMPLE DATE | MEDIA | ANALYSIS |
|---|---|---|---|
| B09332 | 9/9/93 | SOIL | see Notes |
| B09333 | 9/10/93 | SOIL | |
| B09336 | 9/10/93 | SOIL | |

Notes:

1. Samples were analyzed for gross alpha, gross beta, selenium 79, strontium 90, technetium 99, iodine 129, isotopic uranium, isotopic plutonium, total uranium, neptunium 237, americium 241, curium 244 and selected isotopes by gamma spectroscopy.

2. All samples were 100% validated.

Data validation was conducted in accordance with the WHC statement of work (WHC 1993a) and validation procedures (WHC 1993b). Attachments 1 through 5 provide the following information as indicated below:

Attachment 1. Glossary of Data Reporting Qualifiers
Attachment 2. Summary of Data Qualifications
Attachment 3. Qualified Data Summary and Annotated Laboratory Reports
Attachment 4. Laboratory Narrative and Chain-of-Custody Documentation
Attachment 5. Data Validation Supporting Documentation

## DATA QUALITY OBJECTIVES

**Precision.** Goals for precision were met.

**Accuracy.** Goals for accuracy were met.

**Sample Result Verification.** All sample results were supported in the raw data. However, sample results for total uranium and minimum detectable activities for neptunium-237 and iodine-129 could not be verified accurately by recalculation. No qualification was applied since the sample results were supported in the raw data.

9413225.1773

**Detection Limits.** Detection limit goals were met for all sample results as specified in the laboratory statement of work, with the following exceptions:

| SAMPLE ID | ANALYTE | MINIMUM DETECTABLE ACTIVITY REPORTED | REQUIRED DETECTION LIMIT |
|---|---|---|---|
| B09332 | Iron 59 | 0.1 | 0.05 |
| | Selenium 79 | 20 | 10 |
| B09333 | Iron 59 | 0.2 | 0.05 |
| | Cobalt 58 | 0.06 | 0.05 |
| | Cobalt 60 | 0.06 | 0.05 |
| | Europium 155 | 0.2 | 0.1 |
| B09336 | Selenium 79 | 40 | 10 |
| | Iron 59 | 0.1 | 0.05 |

**Completeness.** The data package was complete for all requested analyses. Three samples were validated in this data package with a total of 105 determinations reported, of which all were deemed valid. This results in a completeness of 100 percent, which meets the work plan data quality objectives of 90%.

MAJOR DEFICIENCIES

No major deficiencies were identified which required qualification of results as unusable.

MINOR DEFICIENCIES

Laboratory Blanks

- Gross beta was reported in the reagent blank therefore all sample results have been qualified as estimated (J).

REFERENCES

WHC 1993a, Validation of 200-UP-2 Data, Statement of Work, Analytical Laboratory Data Validation, Task Order S-94-18, December 14, 1993, Purchase Order M073750. Westinghouse Hanford Company, Richland, Washington.

WHC, 1993b, Data Validation Procedures for Radiochemical Analyses, WHC-SD-EN-SPP-001, Rev. 1. December 1993. Westinghouse Hanford Company, Richland, Washington.

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ATTACHMENT 1

GLOSSARY OF DATA REPORTING QUALIFIERS

U - Indicates the constituent was analyzed for, but was not detected at a concentration above the minimum detectable activity (MDA). The concentration reported is the MDA corrected for sample aliquot size, dilution factors and percent solids (in the case of solid matrices) by the laboratory. The associated data should be considered usable for decision making purposes.

UJ - Indicates the constituent was analyzed for and was not detected at a concentration above the MDA. Due to a quality control deficiency identified during data validation, the concentration reported may not accurately reflect the sample MDA. The associated data should be considered usable for decision making purposes.

J - Indicates the constituent was analyzed for and detected. The concentration reported is qualified as estimated due to a quality control deficiency identified during data validation. The associated data should be considered usable for decision making purposes.

UR - Indicates the constituent was analyzed for and not detected. The concentration reported is qualified as unusable due to a quality control deficiency identified during data validation. The associated data should be considered unusable for decision making purposes.

R - Indicates the constituent was analyzed for and detected. The concentration reported is qualified as unusable due to a quality control deficiency identified during data validation. The associated data should be considered unusable for decision making purposes.

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ATTACHMENT 2

SUMMARY OF DATA QUALIFICATIONS

9413225.1776

# DATA QUALIFICATION SUMMARY - FORM B7

| SDG: B09332-TMA-611 | Validator: K. Angelos | Date: March 15, 1994 | Page 1 OF 1 |
|---|---|---|---|
| Comments: Radiochemistry | | | |
| Compound/Analyte | Qualifier | Samples Affected | Reason |
| Gross Beta | J | All | Detected in reagent blank |

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ATTACHMENT 3

QUALIFIED DATA SUMMARY AND
ANNOTATED LABORATORY REPORTS

9413225.1778

Validated Data Summary, Data Package: B09332-TMA-611

| | Samp# | B09332 | | B09333 | | B09336 | |
|---|---|---|---|---|---|---|---|
| | Date | 9-9-93 | | 9-10-93 | | 9-10-93 | |
| | Location | 299-W19-95 | | 299-W19-97 | | 299-W19-95 | |
| | Depth | 60.00 - 62.50 | | 50.00 - 52.50 | | 74.80 - 77.30 | |
| | Type | --- | | --- | | --- | |
| | Comments | --- | | --- | | --- | |
| Parameter | Units | Result | Q | Result | Q | Result | Q |
| GROSS ALPHA | µCi/g | 4.500 | | 3.600 | | 4.000 | |
| GROSS BETA | µCi/g | 14.000 | J | 12.000 | J | 16.000 | J |
| SELENIUM-79 | µCi/g | 5.000 | U | 20.000 | U | 40.000 | U |
| STRONTIUM-90 | µCi/g | 0.700 | U | 0.800 | U | 0.800 | U |
| TECHNETIUM-99 | µCi/g | 0.120 | | 0.210 | | 0.140 | |
| IODINE-129 | µCi/g | 0.300 | U | 1.000 | U | 2.000 | U |
| URANIUM-233/234 | µCi/g | 0.370 | | 0.230 | | 0.430 | |
| URANIUM-235 | µCi/g | 0.100 | U | 0.100 | U | 0.100 | U |
| URANIUM-238 | µCi/g | 0.230 | | 0.340 | | 0.590 | |
| TOTAL URANIUM | µCi/g | 1.100 | | 1.100 | | 1.200 | |
| NEPTUNIUM-237 | µCi/g | 0.040 | U | 0.030 | U | 0.011 | |
| PLUTONIUM-238 | µCi/g | 0.010 | U | 0.030 | U | 0.040 | U |
| PLUTONIUM-239/240 | µCi/g | 0.020 | U | 0.030 | U | 0.030 | U |
| AMERICIUM-241 | µCi/g | 0.020 | U | 0.010 | U | 0.010 | U |
| CURIUM-244 | µCi/g | 0.010 | U | 0.020 | U | 0.010 | U |
| SODIUM-22 | µCi/g | 0.050 | U | 0.070 | U | 0.050 | U |
| POTASSIUM-40 | µCi/g | 13.000 | | 14.000 | | 12.000 | |
| MANGANESE-54 | µCi/g | 0.040 | U | 0.060 | U | 0.030 | U |
| IRON-59 | µCi/g | 0.100 | U | 0.200 | U | 0.100 | U |
| COBALT-58 | µCi/g | 0.040 | U | 0.060 | U | 0.040 | U |
| COBALT-60 | µCi/g | 0.040 | U | 0.060 | U | 0.030 | U |
| NIOBIUM-94 | µCi/g | 0.040 | U | 0.040 | U | 0.030 | U |
| RUTHENIUM-103 | pCi/g | 0.050 | U | 0.060 | U | 0.040 | U |
| RUTHENIUM-106 | µCi/g | 0.300 | U | 0.400 | U | 0.300 | U |
| TIN-113 | µCi/g | 0.040 | U | 0.060 | U | 0.040 | U |
| CESIUM-134 | µCi/g | 0.050 | U | 0.070 | U | 0.040 | U |
| CESIUM-137 | µCi/g | 0.040 | U | 0.050 | U | 0.040 | U |
| CERIUM-144 | µCi/g | 0.200 | U | 0.300 | U | 0.200 | U |
| EUROPIUM-152 | µCi/g | 0.090 | U | 0.100 | U | 0.080 | U |
| EUROPIUM-154 | µCi/g | 0.060 | U | 0.070 | U | 0.050 | U |
| EUROPIUM-155 | pCi/g | 0.100 | U | 0.200 | U | 0.100 | U |
| RADIUM-226 | µCi/g | 0.380 | | 0.530 | | 0.430 | |
| RADIUM-228 | µCi/g | 0.700 | | 0.840 | | 0.560 | |
| THORIUM-228 | µCi/g | 0.640 | | 0.940 | | 0.730 | |
| THORIUM-232 | µCi/g | 0.700 | | 0.840 | | 0.560 | |

N309048-01

# TMA NORCAL
REPORTING GROUP 7241

## DATA SHEET

B09332

| | | | |
|---|---|---|---|
| SDG | 7241 | Client | Westinghouse Hanford |
| Contact | Dinkar Kharkar | Contract | MBH-SVV-069262 |
| Lab sample id | N309048-01 | Client sample id | B09332 |
| Dept sample id | 7241-001 | Location/Matrix | 200-UP-2 SOLID |
| Received | 09/14/93 | Collected | 09/09/93 |
| % moisture | 2.1 | Chain of custody id | EFL-1091 |

| ANALYTE | CAS NO | RESULT pCi/g | 2σ ERR (COUNT) | MDA pCi/g | RDL pCi/g | QUALI-FIERS | TEST |
|---|---|---|---|---|---|---|---|
| Gross Alpha | Alpha | 4.5 | 3.7 | 4 | 10 | ~~J~~ | 80A |
| Gross Beta | Beta | 14 | 4.1 | 5 | 10 | ~~B~~ J | 80B |
| Selenium 79 | 15758-45-9 | 1.8 | 2.1 | 5 | 10 | U | SE |
| Strontium 90 | 10098-97-2 | -0.058 | 0.89 | 0.7 | 1 | U | Y |
| Technetium 99 | 14133-76-7 | 0.12 | 0.053 | 0.1 | 0.5 | ~~J~~ | TC |
| Iodine 129 | 15046-84-1 | 0.20 | 0.14 | 0.3 | 2 | U | I |
| Uranium 233/234 | | 0.37 | 0.14 | 0.1 | 0.3 | | U |
| Uranium 235 | 15117-96-1 | 0.016 | 0.033 | 0.1 | 0.3 | U | U |
| Uranium 238 | | 0.23 | 0.11 | 0.1 | 0.3 | ~~J~~ | U |
| Total Uranium (ug/g) | 7440-61-1 | 1.1 | 0.20 | 0.03 | 0.1 | ~~X~~ | U_T |
| Neptunium 237 | 13994-20-2 | 0.034 | 0.030 | 0.04 | 0.2 | U | NP |
| Plutonium 238 | 13981-16-3 | -0.002 | 0.004 | 0.01 | 0.05 | U | PU |
| Plutonium 239/240 | | -0.002 | 0.008 | 0.02 | 0.05 | U | PU |
| Americium 241 | 14596-10-2 | 0.002 | 0.010 | 0.02 | 0.05 | U | TP |
| Curium 244 | 13981-15-2 | 0 | 0.007 | 0.01 | 0.05 | U | TP |
| GAMMA SCAN ANALYTES | | | | | | | |
| Sodium 22 | 13966-32-0 | U | | 0.05 | | U | GAM |
| Potassium 40 | 13966-00-2 | 13 | 0.93 | | | | GAM |
| Manganese 54 | 13966-31-9 | U | | 0.04 | | U | GAM |
| Iron 59 | 14596-12-4 | U | | 0.1 | 0.05 | U | GAM |
| Cobalt 58 | 13981-38-9 | U | | 0.04 | 0.05 | U | GAM |
| Cobalt 60 | 10198-40-0 | U | | 0.04 | 0.05 | U | GAM |
| Niobium 94 | 14681-63-1 | U | | 0.04 | | U | GAM |
| Ruthenium 103 | 13968-53-1 | U | | 0.05 | | U | GAM |
| Ruthenium 106 | 13967-48-1 | U | | 0.3 | | U | GAM |
| Tin 113 | 13966-06-8 | U | | 0.04 | | U | GAM |
| Cesium 134 | 13967-70-9 | U | | 0.05 | | U | GAM |
| Cesium 137 | 10045-97-3 | U | | 0.04 | 0.05 | U | GAM |

DATA SHEETS
Page 1
SUMMARY DATA SECTION
Page 19

| | |
|---|---|
| Lab id | TMAN |
| Protocol | WHC-HASM |
| Version | Ver 1.0 |
| Form | DVD-DS |
| Version | 2.27 |
| Report date | 12/21/93 |



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| N309048-01 | TMA NORCAL<br>REPORTING GROUP 7241<br>DATA SHEET, cont | B09332 |
|---|---|---|

| | | | |
|---|---|---|---|
| SDG | 7241 | Client | Westinghouse Hanford |
| Contact | Dinkar Kharkar | Contract | MBH-SVV-069262 |
| Lab sample id | N309048-01 | Client sample id | B09332 |
| Dept sample id | 7241-001 | Location/Matrix | 200-UP-2 SOLID |
| Received | 09/14/93 | Collected | 09/09/93 |
| % moisture | 2.1 | Chain of custody id | EFL-1091 |

| ANALYTE | CAS NO | RESULT pCi/g | 2σ ERR (COUNT) | MDA pCi/g | RDL pCi/g | QUALI-FIERS | TEST |
|---|---|---|---|---|---|---|---|
| Cerium 144 | 14762-78-8 | U | | 0.2 | | U | GAM |
| Europium 152 | 14683-23-9 | U | | 0.09 | 0.1 | U | GAM |
| Europium 154 | 15585-10-1 | U | | 0.06 | 0.1 | U | GAM |
| Europium 155 | 14391-16-3 | U | | 0.1 | 0.1 | U | GAM |
| Radium 226 | 13982-63-3 | 0.38 | 0.084 | | | | GAM |
| Radium 228 | 15262-20-1 | 0.70 | 0.15 | | | | GAM |
| Thorium 228 | 14274-82-9 | 0.64 | 0.053 | | | | GAM |
| Thorium 232 | 7440-29-1 | 0.70 | 0.15 | | | | GAM |

| LAB SAMPLE | TEST | PLANCHET | SUFFIX | ALIQUOT | ANALYZED | REVIEWED | BY |
|---|---|---|---|---|---|---|---|
| N309048-01 | 80A/80 | 7241-001 | | 0.100 g | 10/13/93 | 10/15/93 | DPK |
| N309048-01 | 80B/80 | 7241-001 | | 0.100 g | 10/13/93 | 10/15/93 | DPK |
| N309048-01 | SE | 7241-001 | | 0.540 g | 11/10/93 | 11/17/93 | DPK |
| N309048-01 | Y | 7241-001 | | 1.00 g | 10/13/93 | 10/18/93 | DPK |
| N309048-01 | TC | 7241-001 | | 2.02 g | 10/08/93 | 10/12/93 | DPK |
| N309048-01 | I | 7241-001 | | 1.00 g | 11/29/93 | 12/01/93 | DPK |
| N309048-01 | U | 7241-001 | | 1.00 g | 10/20/93 | 10/22/93 | DPK |
| N309048-01 | U_T | 7241-001 | | 0.250 g | 10/07/93 | 11/30/93 | DPK |
| N309048-01 | NP | 7241-001 | | 1.00 g | 10/21/93 | 10/27/93 | DPK |
| N309048-01 | PU | 7241-001 | | 1.00 g | 10/18/93 | 10/20/93 | DPK |
| N309048-01 | TP | 7241-001 | A2 | 1.00 g | 12/15/93 | 12/16/93 | DPK |
| N309048-01 | GAM | 7241-001 | | 880 g | 09/29/93 | 09/30/93 | DPK |



Reviewed 12/14/93

| | |
|---|---|
| Lab id | TMAN |
| Protocol | WHC-HASM |
| Version | Ver 1.0 |
| Form | DVD-DS |
| Version | 2.27 |
| Report date | 12/21/93 |



9413225.1781

N309048-02

# TMA NORCAL
REPORTING GROUP 7241

## DATA SHEET

B09333

| | | | |
|---|---|---|---|
| SDG | 7241 | Client | Westinghouse Hanford |
| Contact | Dinkar Kharkar | Contract | MBH-SVV-069262 |
| Lab sample id | N309048-02 | Client sample id | B09333 |
| Dept sample id | 7241-002 | Location/Matrix | 200-UP-2 SOLID |
| Received | 09/14/93 | Collected | 09/10/93 |
| % moisture | 19.5 | Chain of custody id | EFL-1091 |

| ANALYTE | CAS NO | RESULT pCi/g | 2σ ERR (COUNT) | MDA pCi/g | RDL pCi/g | QUALI-FIERS | TEST |
|---|---|---|---|---|---|---|---|
| Gross Alpha | Alpha | 3.6 | 2.9 | 3 | 10 | ~~J~~ | 80A |
| Gross Beta | Beta | 12 | 3.8 | 5 | 10 | ~~B~~ J | 80B |
| Selenium 79 | 15758-45-9 | -9.0 | 11 | 20 | 10 | U | SE |
| Strontium 90 | 10098-97-2 | 0.11 | 0.24 | 0.8 | 1 | U | Y |
| Technetium 99 | 14133-76-7 | 0.21 | 0.078 | 0.1 | 0.5 | ~~J~~ | TC |
| Iodine 129 | 15046-84-1 | 0.070 | 0.65 | 1 | 2 | U | I |
| Uranium 233/234 | | 0.23 | 0.13 | 0.1 | 0.3 | ~~J~~ | U |
| Uranium 235 | 15117-96-1 | 0.046 | 0.062 | 0.1 | 0.3 | U | U |
| Uranium 238 | | 0.34 | 0.13 | 0.1 | 0.3 | | U |
| Total Uranium (ug/g) | 7440-61-1 | 1.1 | 0.20 | 0.03 | 0.1 | ~~X~~ | U_T |
| Neptunium 237 | 13994-20-2 | -0.003 | 0.013 | 0.03 | 0.2 | U | NP |
| Plutonium 238 | 13981-16-3 | 0.004 | 0.009 | 0.03 | 0.05 | U | PU |
| Plutonium 239/240 | | -0.004 | 0.009 | 0.03 | 0.05 | U | PU |
| Americium 241 | 14596-10-2 | 0.003 | 0.009 | 0.01 | 0.05 | U | TP |
| Curium 244 | 13981-15-2 | 0.001 | 0.009 | 0.02 | 0.05 | U | TP |
| GAMMA SCAN ANALYTES | | | | | | | |
| Sodium 22 | 13966-32-0 | U | | 0.07 | | U | GAM |
| Potassium 40 | 13966-00-2 | 14 | 1.1 | | | | GAM |
| Manganese 54 | 13966-31-9 | U | | 0.06 | | U | GAM |
| Iron 59 | 14596-12-4 | U | | 0.2 | 0.05 | U | GAM |
| Cobalt 58 | 13981-38-9 | U | | 0.06 | 0.05 | U | GAM |
| Cobalt 60 | 10198-40-0 | U | | 0.06 | 0.05 | U | GAM |
| Niobium 94 | 14681-63-1 | U | | 0.04 | | U | GAM |
| Ruthenium 103 | 13968-53-1 | U | | 0.06 | | U | GAM |
| Ruthenium 106 | 13967-48-1 | U | | 0.4 | | U | GAM |
| Tin 113 | 13966-06-8 | U | | 0.06 | | U | GAM |
| Cesium 134 | 13967-70-9 | U | | 0.07 | | U | GAM |
| Cesium 137 | 10045-97-3 | U | | 0.05 | 0.05 | U | GAM |

Reviewed 3/14/94

| | |
|---|---|
| Lab id | TMAN |
| Protocol | WHC-HASM |
| Version | Ver 1.0 |
| Form | DVD-DS |
| Version | 2.27 |
| Report date | 12/21/93 |



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N309048-02

# TMA NORCAL
REPORTING GROUP 7241

## DATA SHEET, cont

B09333

| | | | |
|---|---|---|---|
| SDG | 7241 | Client | Westinghouse Hanford |
| Contact | Dinkar Kharkar | Contract | MBH-SVV-069262 |
| Lab sample id | N309048-02 | Client sample id | B09333 |
| Dept sample id | 7241-002 | Location/Matrix | 200-UP-2 SOLID |
| Received | 09/14/93 | Collected | 09/10/93 |
| % moisture | 19.5 | Chain of custody id | EFL-1091 |

| ANALYTE | CAS NO | RESULT pCi/g | 2σ ERR (COUNT) | MDA pCi/g | RDL pCi/g | QUALI-FIERS | TEST |
|---|---|---|---|---|---|---|---|
| Cerium 144 | 14762-78-8 | U | | 0.3 | | U | GAM |
| Europium 152 | 14683-23-9 | U | | 0.1 | 0.1 | U | GAM |
| Europium 154 | 15585-10-1 | U | | 0.07 | 0.1 | U | GAM |
| Europium 155 | 14391-16-3 | U | | 0.2 | 0.1 | U | GAM |
| Radium 226 | 13982-63-3 | 0.53 | 0.11 | | | | GAM |
| Radium 228 | 15262-20-1 | 0.84 | 0.25 | | | | GAM |
| Thorium 228 | 14274-82-9 | 0.94 | 0.068 | | | | GAM |
| Thorium 232 | 7440-29-1 | 0.84 | 0.25 | | | | GAM |

| LAB SAMPLE | TEST | PLANCHET | SUFFIX | ALIQUOT | ANALYZED | REVIEWED | BY |
|---|---|---|---|---|---|---|---|
| N309048-02 | 80A/80 | 7241-002 | | 0.100 g | 10/13/93 | 10/15/93 | DPK |
| N309048-02 | 80B/80 | 7241-002 | | 0.100 g | 10/13/93 | 10/15/93 | DPK |
| N309048-02 | SE | 7241-002 | | 0.530 g | 11/10/93 | 11/17/93 | DPK |
| N309048-02 | Y | 7241-002 | | 1.00 g | 10/13/93 | 10/18/93 | DPK |
| N309048-02 | TC | 7241-002 | | 2.00 g | 10/08/93 | 10/13/93 | DPK |
| N309048-02 | I | 7241-002 | | 1.00 g | 10/29/93 | 11/02/93 | DPK |
| N309048-02 | U | 7241-002 | | 1.00 g | 10/20/93 | 10/22/93 | DPK |
| N309048-02 | U_T | 7241-002 | | 0.250 g | 10/07/93 | 11/30/93 | DPK |
| N309048-02 | NP | 7241-002 | | 1.00 g | 10/21/93 | 10/28/93 | DPK |
| N309048-02 | PU | 7241-002 | | 1.00 g | 10/14/93 | 10/18/93 | DPK |
| N309048-02 | TP | 7241-002 | A2 | 1.00 g | 12/15/93 | 12/16/93 | DPK |
| N309048-02 | GAM | 7241-002 | | 658 g | 09/29/93 | 09/30/93 | DPK |

| | |
|---|---|
| Lab id | TMAN |
| Protocol | WHC-HASM |
| Version | Ver 1.0 |
| Form | DVD-DS |
| Version | 2.27 |
| Report date | 12/21/93 |



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N309048-03

# TMA NORCAL
REPORTING GROUP 7241

## DATA SHEET

B09336

| | | | |
|---|---|---|---|
| SDG | 7241 | Client | Westinghouse Hanford |
| Contact | Dinkar Kharkar | Contract | MBH-SVV-069262 |
| Lab sample id | N309048-03 | Client sample id | B09336 |
| Dept sample id | 7241-003 | Location/Matrix | 200-UP-2 SOLID |
| Received | 09/14/93 | Collected | 09/10/93 |
| % moisture | 3.0 | Chain of custody id | EFL-1091 |

| ANALYTE | CAS NO | RESULT pCi/g | 2σ ERR (COUNT) | MDA pCi/g | RDL pCi/g | QUALIFIERS | TEST |
|---|---|---|---|---|---|---|---|
| Gross Alpha | Alpha | 4.0 | 3.2 | 3 | 10 | ~~J~~ | 80A |
| Gross Beta | Beta | 16 | 4.1 | 5 | 10 | ~~B~~ ~~J~~ | 80B |
| Selenium 79 | 15758-45-9 | -28 | 22 | 40 | 10 | U | SE |
| Strontium 90 | 10098-97-2 | -0.042 | 0.74 | 0.8 | 1 | U | Y |
| Technetium 99 | 14133-76-7 | 0.14 | 0.063 | 0.1 | 0.5 | ~~J~~ | TC |
| Iodine 129 | 15046-84-1 | 0.075 | 0.93 | 2 | 2 | U | I |
| Uranium 233/234 | | 0.43 | 0.17 | 0.1 | 0.3 | | U |
| Uranium 235 | 15117-96-1 | 0 | 0.034 | 0.1 | 0.3 | U | U |
| Uranium 238 | | 0.59 | 0.18 | 0.1 | 0.3 | | U |
| Total Uranium (ug/g) | 7440-61-1 | 1.2 | 0.21 | 0.03 | 0.1 | ~~X~~ | U_T |
| Neptunium 237 | 13994-20-2 | 0.011 | 0.015 | 0.01 | 0.2 | ~~J~~ | NP |
| Plutonium 238 | 13981-16-3 | -0.008 | 0.008 | 0.04 | 0.05 | U | PU |
| Plutonium 239/240 | | 0.008 | 0.016 | 0.03 | 0.05 | U | PU |
| Americium 241 | 14596-10-2 | -0.001 | 0.006 | 0.01 | 0.05 | U | TP |
| Curium 244 | 13981-15-2 | 0.004 | 0.006 | 0.01 | 0.05 | U | TP |
| GAMMA SCAN ANALYTES | | | | | | | |
| Sodium 22 | 13966-32-0 | U | | 0.05 | | U | GAM |
| Potassium 40 | 13966-00-2 | 12 | 0.79 | | | | GAM |
| Manganese 54 | 13966-31-9 | U | | 0.03 | | U | GAM |
| Iron 59 | 14596-12-4 | U | | 0.1 | 0.05 | U | GAM |
| Cobalt 58 | 13981-38-9 | U | | 0.04 | 0.05 | U | GAM |
| Cobalt 60 | 10198-40-0 | U | | 0.03 | 0.05 | U | GAM |
| Niobium 94 | 14681-63-1 | U | | 0.03 | | U | GAM |
| Ruthenium 103 | 13968-53-1 | U | | 0.04 | | U | GAM |
| Ruthenium 106 | 13967-48-1 | U | | 0.3 | | U | GAM |
| Tin 113 | 13966-06-8 | U | | 0.04 | | U | GAM |
| Cesium 134 | 13967-70-9 | U | | 0.04 | | U | GAM |
| Cesium 137 | 10045-97-3 | U | | 0.04 | 0.05 | U | GAM |

| | |
|---|---|
| Lab id | TMAN |
| Protocol | WHC-HASM |
| Version | Ver 1.0 |
| Form | DVD-DS |
| Version | 2.27 |
| Report date | 12/21/93 |



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| N309048-03 |
|---|

# TMA NORCAL
REPORTING GROUP 7241

## DATA SHEET, cont

| B09336 |
|---|

| | | | |
|---|---|---|---|
| SDG | 7241 | Client | Westinghouse Hanford |
| Contact | Dinkar Kharkar | Contract | MBH-SVV-069262 |
| Lab sample id | N309048-03 | Client sample id | B09336 |
| Dept sample id | 7241-003 | Location/Matrix | 200-UP-2 SOLID |
| Received | 09/14/93 | Collected | 09/10/93 |
| % moisture | 3.0 | Chain of custody id | EFL-1091 |

| ANALYTE | CAS NO | RESULT pCi/g | 2σ ERR (COUNT) | MDA pCi/g | RDL pCi/g | QUALI-FIERS | TEST |
|---|---|---|---|---|---|---|---|
| Cerium 144 | 14762-78-8 | U | | 0.2 | | U | GAM |
| Europium 152 | 14683-23-9 | U | | 0.08 | 0.1 | U | GAM |
| Europium 154 | 15585-10-1 | U | | 0.05 | 0.1 | U | GAM |
| Europium 155 | 14391-16-3 | U | | 0.1 | 0.1 | U | GAM |
| Radium 226 | 13982-63-3 | 0.43 | 0.087 | | | | GAM |
| Radium 228 | 15262-20-1 | 0.56 | 0.19 | | | | GAM |
| Thorium 228 | 14274-82-9 | 0.73 | 0.067 | | | | GAM |
| Thorium 232 | 7440-29-1 | 0.56 | 0.19 | | | | GAM |

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| LAB SAMPLE | TEST | PLANCHET | SUFFIX | ALIQUOT | ANALYZED | REVIEWED | BY |
|---|---|---|---|---|---|---|---|
| N309048-03 | 80A/80 | 7241-003 | | 0.100 g | 10/13/93 | 10/15/93 | DPK |
| N309048-03 | 80B/80 | 7241-003 | | 0.100 g | 10/13/93 | 10/15/93 | DPK |
| N309048-03 | SE | 7241-003 | | 0.550 g | 11/10/93 | 11/17/93 | DPK |
| N309048-03 | Y | 7241-003 | | 1.00 g | 10/13/93 | 10/18/93 | DPK |
| N309048-03 | TC | 7241-003 | | 2.03 g | 10/09/93 | 10/13/93 | DPK |
| N309048-03 | I | 7241-003 | | 1.00 g | 11/01/93 | 11/02/93 | DPK |
| N309048-03 | U | 7241-003 | | 1.00 g | 10/20/93 | 10/22/93 | DPK |
| N309048-03 | U_T | 7241-003 | | 0.250 g | 10/07/93 | 11/30/93 | DPK |
| N309048-03 | NP | 7241-003 | | 1.00 g | 10/21/93 | 10/27/93 | DPK |
| N309048-03 | PU | 7241-003 | | 1.00 g | 10/14/93 | 10/18/93 | DPK |
| N309048-03 | TP | 7241-003 | A2 | 1.00 g | 12/15/93 | 12/16/93 | DPK |
| N309048-03 | GAM | 7241-003 | | 1020 g | 09/29/93 | 09/30/93 | DPK |

| | |
|---|---|
| Lab id | TMAN |
| Protocol | WHC-HASM |
| Version | Ver 1.0 |
| Form | DVD-DS |
| Version | 2.27 |
| Report date | 12/21/93 |

ATTACHMENT 4

LABORATORY NARRATIVE AND
CHAIN-OF-CUSTODY DOCUMENTATION

9W13225.1786

SDG: 7241
Contact: Dinkar Kharkar

# TMA NORCAL

REPORTING GROUP 7241

Client: Westinghouse Hanford
Contract: MBH-SVV-069262

## CASE NARRATIVE

### 1.0 GENERAL

TMA/Norcal Sample Delivery Group 7241 is comprised of the samples listed on the chain-of-custody documents below. This sample group was processed under the Westinghouse Hanford Company Statement of Work P.O. MBH-SVV-069262.

#### 1.1 Chains-of-Custody

This report includes data for the three soil samples from location 200-UP-2, SAF #93-263 delivered under Field Log Book #EFL-1091. Chain-of-Custody numbers were not provided.

#### 1.2 Sample Volume

One thousand mL plastic bottles containing the samples were received for the analyses. These were not adequate volumes to obtain the required detection limits for the gamma scan analysis.

#### 1.3 Missing Samples

All samples listed under Field Log Book #EFL-1091 were received.

#### 1.4 Holding Times

The samples were collected on September 9 and 10, 1993 and sample processing was initiated within 180 days of collection.

### 2.0 QUALITY CONTROL

The internal quality control consisted of one sample each of a laboratory control sample, a blank, and a replicate. All original analyses were performed with QC samples 7241-04 through 7241-06. Americium-241 and curium-244 analyses were performed with QC samples 7241-09 through 7241-11.

The QC samples were prepared by the Quality Control Department. Copies of the QC notebook pages are included in this data package.

#### 2.1 Laboratory Control Samples

The LCS recovery for neptunium-237 which was 81%, which was below the 3 $\sigma$ total limits of (87 - 113)%, but within the protocol limits of (80-120)%. The LCS recoveries for all other nuclides were acceptable. The MDA's of the results for all analyses met the RDL's except for iodine-129 which was above the RDL due to the higher background of the detector in the region of interest.



9413225.1787

## 2.0 QUALITY CONTROL (cont'd)

### 2.2 Reagent Blanks

The MDA's of the results for all analyses met the RDL's. The gross beta result for the blank with a nominal aliquot of 0.1 g, was 11 pCi/g this was slightly higher than the RDL.

### 2.3 Duplicates

Results were satisfactory for all duplicate analyses. The MDA's of gamma nuclides for the duplicate of sample BO9332 were higher than the RDL's due to the smaller than nominal aliquots available for analysis. The MDA of iron-59 for the original of sample BO9332 was higher than the RDL due to the short half-life of iron-59.

9413225.1788

## 3.0 ANALYSIS NOTES

### 3.1 Gross Alpha Analyses

The average MDA for gross alpha was (4 ± 2) pCi/g. Gross alpha activity above the RDL was not found in any of the samples.

### 3.2 Gross Beta Analyses

The average MDA for gross beta was (5 ± 0.8) pCi/g. Gross beta activity above the RDL was found in all of the samples.

### 3.3 Selenium-79 Analyses

The average yield for five analyses was (82 ± 16)%. The lowest yield was 76% and the highest was 93%. The average MDA was (20 ± 30) pCi/g. Selenium-79 activity above the RDL was not found in any of the samples. The MDA's for samples BO9333 and BO9336 were higher than the RDL due to quenching, resulting in lower scintillation efficiency.

### 3.4 Strontium-90 Analyses

The average yield for six analyses was (84 ± 5)%. The lowest yield was 81% and the highest was 86%. The average MDA was (0.8 ± 0.1) pCi/g. Strontium-90 activity above the RDL was not found in any of the samples.

### 3.5 Technetium-99 Analyses

The average yield for six analyses was (63 ± 11)%. The lowest yield was 55% and the highest was 68%. The average MDA was (0.2 ± 0.2) pCi/g. Technetium-99 activity above the RDL was not found in any of the samples.

SDG: 7241
Contact: Dinkar Kharkar

# TMA NORCAL
REPORTING GROUP 7241

Client: Westinghouse Hanford
Contract: MBH-SVV-069262

## 3.0 ANALYSIS NOTES (cont'd)

### 3.6 Iodine-129 Analyses

The average yield for nine analyses was (72 ± 17)%. The lowest yield was 68% and the highest was 76%. The average MDA was (2 ± 2) pCi/g. Iodine-129 activity above the RDL was not found in any of the samples.

### 3.7 Isotopic Uranium Analyses

The average yield for six analyses was (68 ± 11)%. The lowest yield was 59% and the highest was 75%. The average MDA was (0.1 ± 0) pCi/g. Uranium-233/234 activity above the RDL was found in samples BO9332 and BO9336. Uranium-238 activity above the RDL was found in samples BO9333 and BO9336.

### 3.8 Total Uranium Analyses

The average MDA was (0.3 ± 0.3) μg/g. Uranium concentrations ranging from (1.1 to 1.2) μg/g were found in the samples.

### 3.9 Isotopic Plutonium Analyses

The average yield for six analyses was (41 ± 25)%. The lowest yield was 28% and the highest was 60%. The average MDA was (0.03 ± 0.02) pCi/g. Plutonium-238 and plutonium-239/240 activity above the RDL was not found in any of the samples.

### 3.10 Neptunium-237 Analyses

The average yield for six analyses was (38 ± 15)%. The lowest yield was 31% and the highest yield was 52%. The average MDA was (0.02 ± 0.02) pCi/g. Neptunium-237 activity above the RDL was not found in any of the samples.

### 3.11 Americium-241/Curium-244 Analyses

The average yield for six analyses was (83 ± 13)%. The lowest yield was 74% and the highest yield was 93%. The average MDA was (0.01 ± 0.01) pCi/g. Americium-241 and curium-244 activity above the RDL was not found in any of the samples.

### 3.12 Gamma Scan Analyses

A gamma scan analysis found only natural potassium-40, radium-226, radium-228, thorium-228, and thorium-232 activities in the samples. The MDA of iron-59 in all samples was lower than the RDL due to the short half-life of iron-59. The MDA of cobalt-60 in sample BO9333 was higher than the RDL due to the small sample aliquot available for analyses.

9413225.1789

| Westinghouse Hanford Company | CHAIN OF CUSTODY |
|---|---|

Custody Form Initiator: L E ROGERS

Company Contact: L E ROGERS — Telephone: 376-7690

Project Designation/Sampling Locations: 200-UP-2 — Collection Date: 9-9-93

Ice Chest No.: SML 366 — Field Logbook No.: EFL-1091

Bill of Lading/Airbill No.: — Offsite Property No.:

Method of Shipment: OVERNIGHT AIR SERVICE

Shipped to: TMA

Possible Sample Hazards/Remarks: Keep samples at 4C (SOIL) NONE DETECTABLE

**Sample Identification**

1) B09332

2,120ml ~~1,250ml~~ P:CLP;TAL Metals,Hg,Ti
~~1,250ml~~ Gs:VOA CLP
1,250ml nG:Semi-VOA CLP
1,125ml G:Anions F,Cl,SO4 (EPA 300.0)
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,125ml G:Cyanide CLP
1,125ml Gw:Kerosene (8015M)
1,1000ml P/G:Gross alpha/beta (EP-10), Gamma Spec to include,Cs-134,Cs-137,Co-60,Eu-152, Eu-154,Eu-155,K-40,Ru-106,Na-22 (RC-30), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5) Np-237,(RC-101A, RC-622, EP-5) Pu-238,Pu-239/240 (EP-80, EP-81, EP-5) I-129 (RC-25, RC-605) Sr-90 (RC-306, RC-303, RC-309, RC-304) Tc-99 (RC-24, RC-604) Am-241,Cm-244 (EP-80, EP-90, EP-91, EP-92, EP-93, EP-5) Se-79

9-10-93

2) ~~B09334~~ B09335

2,120ml ~~1,250ml~~ ~~P:CLP;TAL Metals,Hg,Ti~~
~~1,250ml~~ Gs:VOA CLP
~~1,250ml nG:Semi-VOA CLP~~
~~1,125ml G:Anions F,Cl,SO4 (EPA 300.0)~~
~~1,125ml P/G:Anions NO2,NO3 (EPA 353.2)~~
~~1,125ml G:Cyanide CLP~~
~~1,125ml Gw:Kerosene (8015M)~~
~~1,1000ml P/G:Gross alpha/beta (EP-10), Gamma Spec to include,Cs-134,Cs-137,Co-60,Eu-152, Eu-154,Eu-155,K-40,Ru-106,Na-22 (RC-30), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5) Np-237,(RC-101A, RC-622, EP-5) Pu-238,Pu-239/240 (EP-80, EP-81, EP-5) I-129 (RC-25, RC-605) Sr-90 (RC-306, RC-303, RC-309, RC-304) Tc-99 (RC-24, RC-604) Am-241,Cm-244 (EP-80, EP-90, EP-91, EP-92, EP-93, EP-5) Se-79~~

9-10-93

3)

1,250ml P:CLP;TAL Metals,Hg,Ti
~~1,250ml Gs:VOA CLP~~
1,250ml nG:Semi-VOA CLP
1,125ml G:Anions F,Cl,SO4 (EPA 300.0)
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,125ml G:Cyanide CLP
1,125ml Gw:Kerosene (8015M)
1,1000ml P/G:Gross alpha/beta (EP-10), Gamma Spec to include,Cs-134,Cs-137,Co-60,Eu-152, Eu-154,Eu-155,K-40,Ru-106,Na-22 (RC-30), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5) Np-237,(RC-101A, RC-622, EP-5) Pu-238,Pu-239/240 (EP-80, EP-81, EP-5) I-129 (RC-25, RC-605) Sr-90 (RC-306, RC-303, RC-309, RC-304) Tc-99 (RC-24, RC-604) Am-241,Cm-244 (EP-80, EP-90, EP-91, EP-92, EP-93, EP-5) Se-79

[] Field Transfer of Custody — Chain of Possession — (Sign and Print Names)

| Relinquished by: | Received by: | Date/Time: |
|---|---|---|
| 1040 Karen E. Rogers 9-10-93 | Roy T. Sample | 1040 9-10-93 |
| Relinquished by: Roy T. Sample 1054 9-10-93 | Received by: H. Narciso | Date/Time: 9-14-93 10:50 |
| Relinquished by: | Received by: | Date/Time: |
| Relinquished by: | Received by: | Date/Time: |

**Final Sample Disposition**

| Disposal Method: | Disposed by: | Date/Time: |
|---|---|---|

Comments:

A-6000-407 (12/90) (EF) WEF061
Chain of Custody

| Westinghouse Hanford Company | CHAIN OF CUSTODY |
|---|---|

Custody Form Initiator: L E ROGERS

Company Contact: L E ROGERS — Telephone: 376-7690

Project Designation/Sampling Locations: 200-UP-2 — Collection Date: 9-10-93

Ice Chest No.: SML 366 — Field Logbook No.: EFL-1091

Bill of Lading/Airbill No.: — Offsite Property No.:

Method of Shipment: OVERNIGHT AIR SERVICE

Shipped to: TMA

Possible Sample Hazards/Remarks: Keep samples at 4C (SOIL) NONE DETECTED

**Sample Identification**

1) B09333

1,250ml P:CLP;TAL Metals,Hg,Ti
1,250ml Gs:VOA CLP
1,250ml aG:Semi-VOA CLP
1,125ml G:Anions F,Cl,SO4 (EPA 300.0)
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,125ml G:Cyanide CLP
1,125ml Gw:Kerosene (8015M)
1,1000ml P/G:Gross alpha/beta (EP-10), Gamma Spec to include,Cs-134,Cs-137,Co-60,Eu-152, Eu-154,Eu-155,K-40,Ru-106,Na-22 (RC-30), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5) Np-237,(RC-101A, RC-622, EP-5) Pu-238,Pu-239/240 (EP-80, EP-81, EP-5) I-129 (RC-25, RC-605) Sr-90 (RC-306, RC-303, RC-309, RC-304) Tc-99 (RC-24, RC-604) Am-241,Cm-244 (EP-80, EP-90, EP-91, EP-92, EP-93, EP-5) Se-79

2) B09336

1,250ml P:CLP;TAL Metals,Hg,Ti
~~1,250ml~~ 2,500ml Gs:VOA CLP
1,250ml aG:Semi-VOA CLP
1,125ml G:Anions F,Cl,SO4 (EPA 300.0)
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,125ml G:Cyanide CLP
1,125ml Gw:Kerosene (8015M)
1,1000ml P/G:Gross alpha/beta (EP-10), Gamma Spec to include,Cs-134,Cs-137,Co-60,Eu-152, Eu-154,Eu-155,K-40,Ru-106,Na-22 (RC-30), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5) Np-237,(RC-101A, RC-622, EP-5) Pu-238,Pu-239/240 (EP-80, EP-81, EP-5) I-129 (RC-25, RC-605) Sr-90 (RC-306, RC-303, RC-309, RC-304) Tc-99 (RC-24, RC-604) Am-241,Cm-244 (EP-80, EP-90, EP-91, EP-92, EP-93, EP-5) Se-79

JGR 9-10-93

3)

1,250ml P:CLP;TAL Metals,Hg,Ti
1,250ml Gs:VOA CLP
1,250ml aG:Semi-VOA CLP
1,125ml G:Anions F,Cl,SO4 (EPA 300.0)
1,125ml P/G:Anions NO2,NO3 (EPA 353.2)
1,125ml G:Cyanide CLP
1,125ml Gw:Kerosene (8015M)
1,1000ml P/G:Gross alpha/beta (EP-10), Gamma Spec to include,Cs-134,Cs-137,Co-60,Eu-152, Eu-154,Eu-155,K-40,Ru-106,Na-22 (RC-30), Total Uranium (EA-01C) U-235,U-234,U-238 (EP-70, EP-71, EP-5) Np-237,(RC-101A, RC-622, EP-5) Pu-238,Pu-239/240 (EP-80, EP-81, EP-5) I-129 (RC-25, RC-605) Sr-90 (RC-306, RC-303, RC-309, RC-304) Tc-99 (RC-24, RC-604) Am-241,Cm-244 (EP-80, EP-90, EP-91, EP-92, EP-93, EP-5) Se-79

JGR 9-10-93

[] Field Transfer of Custody — Chain of Possession — (Sign and Print Names)

| Relinquished by: | Received by: | Date/Time: |
|---|---|---|
| 1040 9-10-93 | Roy T Sicilia | 9-10-93 1040 |
| Relinquished by: Roy T Sicilia 1054 9-10-93 | Received by: A. Harris | Date/Time: 9-14-93 10:50 |
| Relinquished by: | Received by: | Date/Time: |
| Relinquished by: | Received by: | Date/Time: |

**Final Sample Disposition**

| Disposal Method: | Disposed by: | Date/Time: |
|---|---|---|

Comments:

A-6000-407 (12/90) (EF) WEF061
Chain of Custody

74

9413225.1791

-019

ATTACHMENT 5

DATA VALIDATION SUPPORTING DOCUMENTATION

9113225.1792

# RADIOCHEMICAL DATA VALIDATION CHECKLIST

| VALIDATION LEVEL: | A | B | C | D | E |
|---|---|---|---|---|---|

| | | |
|---|---|---|
| PROJECT: 200-UP-2 | | DATA PACKAGE: B09332-TMA-611 |
| VALIDATOR: L. Angelos | LAB: TMA/NorCal | DATE: 3/14/94 |
| CASE: | | SDG: =241 |

ANALYSES PERFORMED

| | | | | | |
|---|---|---|---|---|---|
| ☑ Gross Alpha/Beta | ☑ Strontium-90 | ☐ Technetium-99 | ☑ Alpha Spectroscopy U, Pu, Am241, Cm244 | ☑ Gamma Spectroscopy | |
| ☑ Total Uranium | ☐ Radium-22 | ☐ Tritium | ☑ I-129 | Np-237 | |

SAMPLES/MATRIX B09332, B09336, B09333

1. Completeness . . . . . ☐ N/A

Technical verification forms present? . . . . . (Yes) No N/A

Comments: Technical verification completed by WHC

2. Initial Calibration . . . . . ☐ N/A

Instruments/detectors calibrated within one year of sample analysis? . . . . . Yes (No) N/A

Initial calibration acceptable? . . . . . (Yes) No N/A

Standards NIST traceable? . . . . . (Yes) No N/A

Standards Expired? . . . . . Yes (No) N/A

Comments: Certificates of Initial Calibration provided along with certificates for standards.





9413225.1793

3. Continuing Calibration . . . . . ☐ N/A

Calibration checked within one week of sample analysis? . . . (Yes) No N/A
Calibration check acceptable? . . . . . (Yes) No N/A
Calibration check standards NIST traceable? . . . . . (Yes) No N/A
Calibration check standards expired? . . . . . Yes (No) N/A

Comments: Control limits not provided for LBG used limits of 90 - 110

4. Blanks . . . . . ☐ N/A

Method blank analyzed? . . . . . (Yes) No N/A
Method blank results acceptable? . . . . . (Yes) No N/A
Analytes detected in method blank? . . . . . (Yes) No N/A
Field blank(s) analyzed? . . . . . Yes No (N/A)
Field blank results acceptable? . . . . . Yes No (N/A)
Analytes detected in field blank(s)? . . . . . Yes No (N/A)
Transcription/Calculation Errors? . . . . . Yes (No) N/A

Comments: Gross beta reported in recent blank at 11 pCi/g. All sample results qualified as estimated (J)

5. Matrix Spikes . . . . . ☑ N/A

Matrix spike analyzed? . . . . . Yes No (N/A)
Spike recoveries acceptable? . . . . . Yes No (N/A)
Spike source traceable? . . . . . Yes No (N/A)
Spike source expired? . . . . . Yes No (N/A)
Transcription/Calculation Errors? . . . . . Yes No (N/A)

Comments: LCS established in lieu of matrix spike

9413225.1794

6. Laboratory Control Samples . . . . . ☐ N/A

LCS analyzed? . . . . . Yes No N/A
LCS recoveries acceptable? . . . . . Yes No N/A
LCS traceable? . . . . . Yes No N/A
Transcription/Calculation Errors? . . . . . Yes No N/A

Comments: _____

7. Chemical Recovery . . . . . ☐ N/A

Chemical carrier added? . . . . . Yes No N/A
Chemical recovery acceptable? . . . . . Yes No N/A
Chemical carrier traceable? . . . . . Yes No N/A
Chemical carrier expired? . . . . . Yes No N/A
Transcription/Calculation errors? . . . . . Yes No N/A

Comments: _____

8. Duplicates . . . . . ☐ N/A

Duplicates Analyzed? . . . . . Yes No N/A
RPD Values Acceptable? . . . . . Yes No N/A
Transcription/Calculation Errors? . . . . . Yes No N/A

Comments: _____

9413225.1795

9. Field QC Samples . . . . . ☑ N/A

Field duplicate sample(s) analyzed? . . . . . Yes No N/A
Field duplicate RPD values acceptable? . . . . . Yes No N/A
Field split sample(s) analyzed? . . . . . Yes No N/A
Field split RPD values acceptable? . . . . . Yes No N/A
Performance audit sample(s) analyzed? . . . . . Yes No N/A
Performance audit sample results acceptable? . . . . . Yes No N/A

Comments:

9413225.1796

10. Holding Times

Are sample holding times acceptable? . . . . . Yes No N/A

Comments: All samples analyzed w/i 180 days of collection.

11. Results and Detection Limits (Levels D & E) . . . . . ☐ N/A

Results reported for all required sample analyses? . . . . . Yes No N/A
Results supported in raw data? . . . . . Yes No N/A
Results Acceptable? . . . . . Yes No N/A
Transcription/Calculation errors? . . . . . Yes No N/A
MDA's meet required detection limits? . . . . . Yes No N/A
Transcription/calculation errors? . . . . . Yes No N/A

Comments: MDA's exceeded RDLs as follows:

| Sample | Analyte | MDA | RDL | |
|---|---|---|---|---|
| 200232 | 90Sr-59 | 0.1 | 0.05 | |
| 209233 | Se79 | 20 | 10 | No indication |
| | Fe59 | 0.2 | 0.05 | Hydrometry |
| | Co58 | 0.06 | 0.05 | |
| | Co60 | 0.06 | 0.05 | |
| | Eu155 | 0.2 | 0.1 | |
| 209236 | Se79 | 40 | 10 | |
| | Fe59 | 0.1 | 0.05 | |

N309048-05

# TMA NORCAL
REPORTING GROUP 7241

## REAGENT BLANK

Reagent Blank

SDG 7241 Client Westinghouse Hanford
Contact Dinkar Kharkar Contract MBH-SVV-069262

Lab sample id N309048-05 Client sample id Reagent Blank
Dept sample id 7241-005 Material/Matrix SOLID

| ANALYTE | CAS NO | RESULT pCi/g | 2σ ERR (COUNT) | MDA pCi/g | RDL pCi/g | QUALI-FIERS | TEST |
|---|---|---|---|---|---|---|---|
| Gross Alpha | Alpha | 0.27 | 3.3 | 5 | 10 | U | 80A |
| Gross Beta | Beta | 11 | 4.1 | 6 | 10 | | 80B |
| Selenium 79 | 15758-45-9 | -0.27 | 2.0 | 3 | 10 | U | SE |
| Strontium 90 | 10098-97-2 | 0.003 | 0.85 | 0.8 | 1 | U | Y |
| Technetium 99 | 14133-76-7 | 0.052 | 0.088 | 0.3 | 0.5 | U | TC |
| Iodine 129 | 15046-84-1 | -0.24 | 1.1 | 2 | 2 | U | I |
| Uranium 233/234 | | 0.015 | 0.060 | 0.1 | 0.3 | U | U |
| Uranium 235 | 15117-96-1 | 0 | 0.036 | 0.1 | 0.3 | U | U |
| Uranium 238 | | 0 | 0.030 | 0.1 | 0.3 | U | U |
| Total Uranium (ug/g) | 7440-61-1 | U | | 0.003 | 0.1 | UX | U_T |
| Neptunium 237 | 13994-20-2 | 0.005 | 0.014 | 0.03 | 0.2 | U | NP |
| Plutonium 238 | 13981-16-3 | 0.005 | 0.011 | 0.04 | 0.05 | U | PU |
| Plutonium 239/240 | | 0.005 | 0.011 | 0.04 | 0.05 | U | PU |
| GAMMA SCAN ANALYTES | | | | | | | |
| Sodium 22 | 13966-32-0 | U | | 0.02 | | U | GAM |
| Potassium 40 | 13966-00-2 | U | | 0.4 | | U | GAM |
| Manganese 54 | 13966-31-9 | U | | 0.02 | | U | GAM |
| Iron 59 | 14596-12-4 | U | | 0.04 | 0.05 | U | GAM |
| Cobalt 58 | 13981-38-9 | U | | 0.01 | 0.05 | U | GAM |
| Cobalt 60 | 10198-40-0 | U | | 0.02 | 0.05 | U | GAM |
| Niobium 94 | 14681-63-1 | U | | 0.02 | | U | GAM |
| Ruthenium 103 | 13968-53-1 | U | | 0.02 | | U | GAM |
| Ruthenium 106 | 13967-48-1 | U | | 0.2 | | U | GAM |
| Tin 113 | 13966-06-8 | U | | 0.02 | | U | GAM |
| Cesium 134 | 13967-70-9 | U | | 0.02 | | U | GAM |
| Cesium 137 | 10045-97-3 | U | | 0.02 | 0.05 | U | GAM |
| Cerium 144 | 14762-78-8 | U | | 0.09 | | U | GAM |
| Europium 152 | 14683-23-9 | U | | 0.04 | 0.1 | U | GAM |
| Europium 154 | 15585-10-1 | U | | 0.02 | 0.1 | U | GAM |
| Europium 155 | 14391-16-3 | U | | 0.06 | 0.1 | U | GAM |

Qualify beta as J

Verified MMT 3/21/94

~~U 17~~

Lab id TMAN
Protocol WHC-HASM
Version Ver 1.0
Form DVD-DS
Version 2.27
Report date 12/21/93



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N309048-05

# TMA NORCAL
REPORTING GROUP 7241

## BLANK, cont.

Reagent Blank

SDG 7241 Client Westinghouse Hanford
Contact Dinkar Kharkar Contract MBH-SVV-069262

Lab sample id N309048-05 Client sample id Reagent Blank
Dept sample id 7241-005 Material/Matrix SOLID

| ANALYTE | CAS NO | RESULT pCi/g | 2σ ERR (COUNT) | MDA pCi/g | RDL pCi/g | QUALI-FIERS | TEST |
|---|---|---|---|---|---|---|---|
| Radium 226 | 13982-63-3 | U | | 0.04 | | U | GAM |
| Radium 228 | 15262-20-1 | U | | 0.1 | | U | GAM |
| Thorium 228 | 14274-82-9 | U | | 0.02 | | U | GAM |
| Thorium 232 | 7440-29-1 | U | | 0.1 | | U | GAM |

9413225.1798

| LAB SAMPLE | TEST | PLANCHET | SUFFIX | ALIQUOT | ANALYZED | REVIEWED | BY |
|---|---|---|---|---|---|---|---|
| N309048-05 | 80A/80 | 7241-005 | | 0.100 g | 12/03/93 | 10/15/93 | DPK |
| N309048-05 | 80B/80 | 7241-005 | | 0.100 g | 12/03/93 | 10/15/93 | DPK |
| N309048-05 | SE | 7241-005 | | 0.500 g | 11/10/93 | 11/17/93 | DPK |
| N309048-05 | Y | 7241-005 | | 1.00 g | 10/13/93 | 10/18/93 | DPK |
| N309048-05 | TC | 7241-005 | | 2.00 g | 10/09/93 | 10/13/93 | DPK |
| N309048-05 | I | 7241-005 | | 1.00 g | 11/03/93 | 11/05/93 | DPK |
| N309048-05 | U | 7241-005 | | 1.00 g | 10/20/93 | 10/22/93 | DPK |
| N309048-05 | U_T | 7241-005 | | 0.250 g | 10/07/93 | 11/30/93 | DPK |
| N309048-05 | NP | 7241-005 | | 1.00 g | 10/21/93 | 10/27/93 | DPK |
| N309048-05 | PU | 7241-005 | | 1.00 g | 10/14/93 | 10/18/93 | DPK |
| N309048-05 | GAM | 7241-005 | | 750 g | 09/29/93 | 09/30/93 | DPK |

QC 15455 - 15464

Verified MW 3/21/94

Lab id TMAN
Protocol WHC-HASM
Version Ver 1.0
Form DVD-DS
Version 2.27
Report date 12/21/93

N309048-11

# TMA NORCAL
REPORTING GROUP 7241

## REAGENT BLANK

Reagent Blank

SDG 7241 Client Westinghouse Hanford
Contact Dinkar Kharkar Contract MBH-SVV-069262

Lab sample id N309048-11 Client sample id Reagent Blank
Dept sample id 7241-011 Material/Matrix SOLID

| ANALYTE | CAS NO | RESULT pCi/g | 2σ ERR (COUNT) | MDA pCi/g | RDL pCi/g | QUALI-FIERS | TEST |
|---|---|---|---|---|---|---|---|
| Americium 241 | 14596-10-2 | 0.003 | 0.008 | 0.01 | 0.05 | U | TP |
| Curium 244 | 13981-15-2 | 0 | 0.005 | 0.01 | 0.05 | U | TP |

| LAB SAMPLE | TEST | PLANCHET | SUFFIX | ALIQUOT | ANALYZED | REVIEWED | BY |
|---|---|---|---|---|---|---|---|
| N309048-11 | TP | 7241-011 | | 1.00 g | 12/15/93 | 12/16/93 | DPK |

QC-16710

9413225.1799

Verified
3/20/94

Lab id TMAN
Protocol WHC-HASM
Version Ver 1.0
Form DVD-DS
Version 2.27
Report date 12/21/93

SAMPLE RESULT VERIFICATION, DATA PACKAGE: B09332-TMA-611

B09332-TMA-611
Gross Alpha/Beta

| Sample ID: | B09332 | B09333 | B09336 | QC-LCS | QC-BLANK | B09332-DUP |
|---|---|---|---|---|---|---|
| Aliquot: | 0.10 | 0.10 | 0.10 | 1.00 | 1.00 | 0.10 |
| Detector: | 102 | 104 | 109 | 112 | 110 | 115 |
| Count time: | 100 | 100 | 100 | 100 | 100 | 100 |
| Alpha cpm: | 0.23 | 0.17 | 0.16 | 4.88 | 0.08 | 0.31 |
| Alpha, Bkgd: | 0.09 | 0.05 | 0.04 | 0.05 | 0.07 | 0.09 |
| Alpha, Xtalk: | 0.006 | 0.006 | 0.006 | 0.006 | 0.006 | 0.006 |
| Alpha, Eff: | 0.137 | 0.146 | 0.127 | 0.103 | 0.106 | 0.132 |
| Alpha Result Calc.: | 4.50 | 3.59 | 3.97 | 20.60 | 0.02 | 7.15 |
| Alpha Result Rptd.: | 4.49 | 3.58 | 3.99 | 20.60 | 0.03 | 7.11 |
| Alpha MDA Calc.: | 4.47 | 3.12 | 3.26 | 0.46 | 0.52 | 4.82 |
| Alpha MDA Rptd.: | 4.49 | 3.11 | 3.25 | 0.47 | 0.52 | 4.81 |
| Beta cpm: | 2.50 | 2.14 | 2.58 | 22.06 | 2.25 | 2.48 |
| Bkgd: | 1.13 | 1.02 | 1.04 | 1.10 | 1.25 | 0.99 |
| Xtalk: | 0.268 | 0.262 | 0.275 | 0.296 | 0.293 | 0.271 |
| Eff: | 0.42 | 0.42 | 0.42 | 0.41 | 0.41 | 0.42 |
| Beta Result Calc.: | 14.27 | 11.63 | 16.29 | 21.35 | 1.09 | 15.36 |
| Beta Result Rptd: | 14.30 | 11.70 | 16.30 | 21.40 | 1.09 | 15.40 |
| Beta MDA Calc: | 5.32 | 5.02 | 5.11 | 0.54 | 0.57 | 4.99 |
| Beta MDA rptd: | 5.31 | 5.02 | 5.11 | 0.54 | 0.57 | 4.98 |

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SAMPLE RESULT VERIFICATION, DATA PACKAGE: B09332-TMA-611

Selenium 79

| Sample ID: | B09332 | B09333 | B09336 | QC-BLANK | B09332-DUP |
|---|---|---|---|---|---|
| Detector, LSC: | 5 | 5 | 5 | 5 | 5 |
| Count time: | 150 | 150 | 150 | 150 | 150 |
| Detector Eff: | 0.226 | 0.076 | 0.037 | 0.382 | 0.112 |
| Sample cpm: | 11.19 | 10.16 | 9.8 | 10.67 | 10.52 |
| Bkgd cpm: | 10.73 | 10.77 | 10.77 | 10.77 | 10.73 |
| Yield: | 0.9312 | 0.7711 | 0.7603 | 0.8718 | 0.7593 |
| Decay Corr: | 1 | 1 | 1 | 1 | 1 |
| Aliquot: | 0.54 | 0.53 | 0.55 | 1 | 0.54 |
| Result calc: | 1.82 | -8.85 | -28.24 | -0.14 | -2.06 |
| Result rptd: | 1.80 | -8.95 | -28.40 | -0.14 | -2.06 |
| MDA calc: | 4.94 | 18.11 | 36.35 | 1.69 | 12.23 |
| MDA rptd: | 4.99 | 18.40 | 36.97 | 1.71 | 12.36 |

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Strontium 90

| Sample ID: | B09332 | B09333 | B09336 | QC-LCS | QC-BLANK | B09332-DUP |
|---|---|---|---|---|---|---|
| Detector: | 205 | 206 | 207 | 208 | 209 | 210 |
| Bkg: | 0.3632 | 0.4500 | 0.4020 | 0.5485 | 0.4631 | 0.4201 |
| Count Time: | 33.000 | 33.000 | 33.000 | 33.000 | 33.000 | 33.000 |
| Y90 cpm: | -0.059 | 0.117 | -0.041 | 9.887 | 0.003 | -0.298 |
| Elapsed Time, days: | 33.441 | 32.441 | 32.441 | 0.000 | 0.000 | 33.441 |
| Lambda: | 6.86E-05 | 6.86E-05 | 6.86E-05 | 6.86E-05 | 6.86E-05 | 6.86E-05 |
| Decay: | 0.9977 | 0.9978 | 0.9978 | 1.0000 | 1.0000 | 0.9977 |
| Yield: | 0.8555 | 0.8555 | 0.8038 | 0.8138 | 0.8609 | 0.8138 |
| PPT. corr.: | 1 | 1 | 1 | 1 | 1 | 1 |
| Aliquot: | 1 | 1 | 1 | 1 | 1 | 1 |
| Product: | 0.8535 | 0.8536 | 0.8020 | 0.8138 | 0.8609 | 0.8119 |
| C-zero: | -0.0691 | 0.1371 | -0.0511 | 12.1492 | 0.0035 | -0.3670 |
| P-Factor: | 1.859 | 1.859 | 1.859 | 1.859 | 1.859 | 1.859 |
| Result, calc.: | -0.058 | 0.115 | -0.043 | 10.174 | 0.003 | -0.307 |
| Result, rptd.: | -0.058 | 0.114 | -0.042 | 10.173 | 0.003 | -0.259 |
| MDA, calc.: | 0.776 | 0.864 | 0.767 | 0.909 | 0.883 | 0.794 |
| MDA, rptd.: | 0.746 | 0.817 | 0.811 | 0.933 | 0.820 | 0.829 |

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SAMPLE RESULT VERIFICATION, DATA PACKAGE: B09332-TMA-611

Technetium 99

| Sample ID: | B09332 | B09333 | B09336 | QC-LCS | QC-BLANK | B09332-DUP |
|---|---|---|---|---|---|---|
| Detector: | 13 | 14 | 11 | 12 | 15 | 11 |
| Net, cpm: | 0.150 | 0.280 | 0.180 | 14.760 | 0.060 | 0.070 |
| Days: | 29.985 | 28.985 | 29.003 | 0.000 | 0.000 | 30.618 |
| Lambda: | 8.91E-09 | 8.91E-09 | 8.91E-09 | 8.91E-09 | 8.91E-09 | 8.91E-09 |
| Decay: | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Yield: | 0.629 | 0.676 | 0.680 | 0.569 | 0.651 | 0.553 |
| Aliquot: | 2.020 | 2.000 | 2.000 | 1.000 | 1.000 | 2.040 |
| P-Factor: | 2.340 | 2.340 | 2.340 | 2.340 | 2.340 | 2.340 |
| Count, time: | 583.300 | 583.300 | 556.700 | 556.700 | 123.800 | 123.800 |
| Bkg., cpm: | 0.470 | 0.480 | 0.650 | 0.500 | 0.550 | 0.480 |
| Result, calc.: | 0.125 | 0.218 | 0.140 | 27.347 | 0.097 | 0.065 |
| Result, rptd.: | 0.125 | 0.215 | 0.139 | 27.341 | 0.104 | 0.064 |
| MDA, calc.: | 0.110 | 0.104 | 0.123 | 0.259 | 0.503 | 0.271 |
| MDA, rptd.: | 0.114 | 0.109 | 0.130 | 0.275 | 0.550 | 0.291 |

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SAMPLE RESULT VERIFICATION, DATA PACKAGE: B09332-TMA-611

Total Uranium

| Standard | Intensity | | | Calc | Rptd |
|---|---|---|---|---|---|
| 0.049 | 574 | Sample ID | Intens. | Result | Rslt |
| 0.156 | 1564 | B09332 | 13132 | 1.283 | 1.407 |
| 0.521 | 5160 | B09333 | 14870 | 1.453 | 1.363 |
| 0.976 | 10437 | B09336 | 13631 | 1.332 | 1.364 |
| 2.603 | 26611 | QC-LCS | 16046 | 1.568 | 1.447 |
| 4.881 | 49546 | QC-BLANK | -680 | -0.066 | 0.037 |
| 16.27 | 150595 | B09332-DU | 11930 | 1.166 | 1.335 |

Slope: 9.8E-05

4081 5225 1804

SAMPLE RESULT VERIFICATION, DATA PACKAGE: B09332-TMA-611

Uranium 233/4/5/8

| Sample ID: | B09332 | B09333 | B09336 | QC-LCS | QC-BLANK | B09332-DUP |
|---|---|---|---|---|---|---|
| Detector: | 23 | 24 | 25 | 26 | 27 | 28 |
| Sample count time: | 152 | 152 | 152 | 933.93 | 193.28 | 193.28 |
| GMT count: | 293.790 | 293.790 | 293.790 | 293.790 | 293.790 | 293.790 |
| Zero time: | 252.292 | 252.292 | 252.292 | 252.292 | 252.292 | 252.292 |
| Corr. tracer dpm: | 10.49 | 10.49 | 10.49 | 10.48 | 10.49 | 10.49 |
| Bkgd count time: | 2610.45 | 2610.45 | 2610.45 | 2610.45 | 2610.82 | 2610.45 |
| Net tracer counts: | 348 | 372 | 337 | 2262 | 314 | 358 |
| Detector eff.: | 0.3112 | 0.3124 | 0.3097 | 0.3195 | 0.2625 | 0.267 |
| Yield: | 0.7016 | 0.7468 | 0.6824 | 0.7233 | 0.5900 | 0.6613 |
| U-238, gross counts: | 17 | 28 | 42 | 1847 | 0 | 37 |
| U-238, bkgd counts: | 0 | 1 | 0 | 119 | 0 | 0 |
| U-238, Lambda: | 4.23E-13 | 4.23E-13 | 4.23E-13 | 4.23E-13 | 4.23E-13 | 4.23E-13 |
| U-238, Decay corr: | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| U-235, gross counts: | 1 | 4 | 0 | 1146 | 0 | 5 |
| U-235, bkgd counts: | 0 | 1 | 0 | 5 | 0 | 1 |
| U-235, Lambda: | 2.67E-12 | 2.67E-12 | 2.67E-12 | 2.67E-12 | 2.67E-12 | 2.67E-12 |
| U-235, Decay corr: | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| U-235, branch ratio: | 0.826 | 0.826 | 0.826 | 0.826 | 0.826 | 0.826 |
| U-233/4, gross counts: | 29 | 21 | 32 | 1963 | 2 | 33 |
| U-233/4, bkgd counts: | 2 | 3 | 1 | 141 | 1 | 2 |
| U-233/4, Lambda: | 1.17E-08 | 1.17E-08 | 1.17E-08 | 1.17E-08 | 1.17E-08 | 1.17E-08 |
| U-233/4, Decay corr: | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Aliquot: | 1 | 1 | 1 | 1 | 1 | 1 |
| U-238, result calc.: | 0.231 | 0.343 | 0.589 | 3.606 | 0.000 | 0.488 |
| U-238, result rptd: | 0.230 | 0.340 | 0.590 | 3.600 | 0.000 | 0.490 |
| U-238 MDA calc.: | 0.104 | 0.097 | 0.108 | 0.106 | 0.115 | 0.101 |
| U-238, MDA rptd.: | 0.100 | 0.100 | 0.100 | 0.100 | 0.100 | 0.100 |
| U-235, result calc.: | 0.016 | 0.046 | 0.000 | 2.883 | 0.000 | 0.064 |
| U-235, result rptd.: | 0.016 | 0.046 | 0.000 | 2.900 | 0.000 | 0.064 |
| U-235, MDA calc.: | 0.126 | 0.118 | 0.130 | 0.026 | 0.140 | 0.123 |
| U-235, MDA rptd.: | 0.100 | 0.100 | 0.100 | 0.030 | 0.100 | 0.100 |
| U-233/4, result calc.: | 0.366 | 0.229 | 0.435 | 3.802 | 0.015 | 0.409 |
| U-233/4, result rptd.: | 0.370 | 0.230 | 0.430 | 3.800 | 0.015 | 0.410 |
| U-233/4, MDA calc.: | 0.104 | 0.103 | 0.108 | 0.115 | 0.115 | 0.101 |
| U-233/4, MDA rptd.: | 0.100 | 0.100 | 0.100 | 0.100 | 0.100 | 0.100 |

9413225.1805

SAMPLE RESULT VERIFICATION, DATA PACKAGE: B09332-TMA-611

Plutonium 238/239

| Sample ID: | B09332 | B09333 | B09336 | QC-LCS | QC-BLANK | B09332-DUP |
|---|---|---|---|---|---|---|
| Detector: | 54 | 63 | 64 | 65 | 66 | 57 |
| Count time: | 1046.02 | 725.87 | 725.87 | 725.87 | 725.87 | 1046.02 |
| GMT, count: | 292.091 | 288.237 | 288.237 | 288.237 | 288.237 | 292.091 |
| Zero time: | 252.292 | 253.292 | 253.292 | 288.237 | 288.237 | 252.292 |
| Corr, tracer dpm: | 4.86 | 4.86 | 4.86 | 4.86 | 4.86 | 4.86 |
| Bkgd, count time: | 2739.25 | 2390.63 | 2390.63 | 2390.63 | 2390.63 | 2739.25 |
| Net, tracer counts: | 1145 | 494 | 554 | 461 | 407 | 962 |
| Detector Eff: | 0.3779 | 0.398 | 0.4048 | 0.4159 | 0.4137 | 0.3612 |
| Yield: | 0.5960 | 0.3518 | 0.3879 | 0.3142 | 0.2789 | 0.5239 |
| Pu239, gross counts: | 1 | 0 | 3 | 161 | 1 | 3 |
| Pu239, bkgd counts: | 2 | 1 | 1 | 1 | 0 | 0 |
| Pu-239, Lambda: | 7.78E-08 | 7.78E-08 | 7.78E-08 | 7.78E-08 | 7.78E-08 | 7.78E-08 |
| Pu239 decay: | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 | 1.0000 |
| Pu238, gross counts: | 0 | 1 | 0 | 0 | 1 | 2 |
| Pu238, bkgd counts: | 1 | 0 | 2 | 0 | 0 | 2 |
| Pu-238, Lambda: | 2.20E-05 | 2.20E-05 | 2.20E-05 | 2.20E-05 | 2.20E-05 | 2.20E-05 |
| Pu238 decay: | 0.9991 | 0.9992 | 0.9992 | 1.0000 | 1.0000 | 0.9991 |
| Aliquot: | 1 | 1 | 1 | 1 | 1 | 1 |
| Pu239, Result calc.: | -0.002 | -0.004 | 0.008 | 0.760 | 0.005 | 0.007 |
| Pu239, Result rptd: | -0.002 | -0.004 | 0.008 | 0.760 | 0.005 | 0.007 |
| Pu239, MDA calc.: | 0.015 | 0.034 | 0.030 | 0.036 | 0.041 | 0.017 |
| Pu239, MDA rptd.: | 0.020 | 0.030 | 0.030 | 0.040 | 0.040 | 0.020 |
| Pu238, Result calc.: | -0.002 | 0.004 | -0.008 | 0.000 | 0.005 | 0.000 |
| Pu238, Result rptd.: | -0.002 | 0.004 | -0.008 | 0.000 | 0.005 | 0.000 |
| Pu238, MDA calc.: | 0.015 | 0.034 | 0.030 | 0.036 | 0.041 | 0.017 |
| Pu238, MDA rptd: | 0.010 | 0.030 | 0.030 | 0.040 | 0.040 | 0.020 |

9413225.1806

SAMPLE RESULT VERIFICATION, DATA PACKAGE: B09332-TMA-611

Americium/Curium

| Sample ID: | B09332 | B09333 | B09336 | QC-LCS | QC-BLANK | B09332-DUP |
|---|---|---|---|---|---|---|
| Detector: | 52 | 53 | 54 | 58 | 61 | 57 |
| Count Time: | 973.58 | 973.58 | 973.58 | 973.58 | 973.58 | 973.58 |
| GMT, count: | 350.100 | 350.100 | 350.100 | 350.100 | 350.100 | 350.100 |
| Zero time: | 252.292 | 252.292 | 252.292 | 350.100 | 350.100 | 252.292 |
| Tracer dpm: | 4.95 | 4.95 | 4.95 | 4.95 | 4.95 | 4.95 |
| Bkgd count time: | 2380.13 | 2380.13 | 2380.13 | 2380.13 | 2380.13 | 2380.13 |
| Net tracer counts: | 1376 | 1570 | 1533 | 1663 | 1711 | 1477 |
| Detector eff.: | 0.3835 | 0.3877 | 0.3782 | 0.3712 | 0.4181 | 0.3553 |
| Yield: | 0.7445 | 0.8403 | 0.8411 | 0.9296 | 0.8492 | 0.8626 |
| Aliquot: | 1 | 1 | 1 | 1 | 1 | 1 |
| Am241 gross counts: | 6 | 7 | 4 | 918 | 7 | 3 |
| Am241 bkgd. counts: | 5 | 5 | 5 | 5 | 5 | 4 |
| Am-241, Lambda: | 4.03E-06 | 4.03E-06 | 4.03E-06 | 4.03E-06 | 4.03E-06 | 4.03E-06 |
| Am241 decay: | 0.9996 | 0.9996 | 0.9996 | 1.0000 | 1.0000 | 0.9996 |
| Cm244 gross counts: | 2 | 6 | 5 | 546 | 3 | 0 |
| Cm244 bkgd counts: | 2 | 5 | 2 | 2 | 3 | 2 |
| Cm-244, Lambda: | 1.06E-04 | 1.06E-04 | 1.06E-04 | 1.06E-04 | 1.06E-04 | 1.06E-04 |
| Cm244 decay: | 0.9897 | 0.9897 | 0.9897 | 1.0000 | 1.0000 | 0.9897 |
| Am241 result calc.: | 0.002 | 0.003 | -0.001 | 1.224 | 0.003 | -0.002 |
| Am241 result rptd.: | 0.002 | 0.003 | -0.001 | 1.225 | 0.003 | -0.002 |
| Am241 MDA calc.: | 0.017 | 0.015 | 0.015 | 0.014 | 0.014 | 0.014 |
| Am241 MDA rptd: | 0.016 | 0.014 | 0.014 | 0.013 | 0.013 | 0.012 |
| Cm244 result calc.: | 0.000 | 0.001 | 0.004 | 0.729 | 0.000 | -0.003 |
| Cm244 result rptd: | 0.000 | 0.001 | 0.004 | 0.729 | 0.000 | -0.003 |
| Cm244 MDA calc.: | 0.013 | 0.015 | 0.011 | 0.010 | 0.011 | 0.012 |
| Cm244 MDA rptd.: | 0.013 | 0.018 | 0.011 | 0.010 | 0.013 | 0.012 |

9413225.1807

SAMPLE RESULT VERIFICATION, DATA PACKAGE: B09332-TMA-611

Neptunium

| Sample ID | B09332 | B09333 | B09336 | QC-LCS | QC-BLANK | B09332-DU |
|---|---|---|---|---|---|---|
| Detector: | 53 | 54 | 57 | 66 | 49 | 50 |
| Np239 cpm: | 21.92 | 26.39 | 24.83 | 23.18 | 36.98 | 27.58 |
| Inst. eff.: | 0.721 | 0.721 | 0.721 | 0.721 | 0.721 | 0.721 |
| Am243 added: | 99.08 | 99.08 | 99.08 | 99.08 | 99.08 | 99.08 |
| Yield: | 0.3068 | 0.3694 | 0.3476 | 0.3245 | 0.5177 | 0.3861 |
| Aliquot: | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| Count time: | 1020.87 | 1010.87 | 964.33 | 1054.18 | 993.1 | 993.1 |
| Np237 gross counts: | 12 | 1 | 3 | 789 | 5 | 5 |
| Np237 bkgd counts: | 3 | 2 | 0 | 0 | 3 | 1 |
| Np237 aspec. eff: | 0.386 | 0.378 | 0.367 | 0.413 | 0.364 | 0.355 |
| Np237 result calc.: | 0.034 | -0.003 | 0.011 | 2.516 | 0.005 | 0.013 |
| Np237 result rptd.: | 0.034 | -0.003 | 0.011 | 2.500 | 0.005 | 0.013 |
| Np237 MDA calc.: | 0.030 | 0.024 | 0.028 | 0.024 | 0.019 | 0.025 |
| Np237 MDA rptd.: | 0.040 | 0.030 | 0.011 | 0.010 | 0.027 | 0.025 |

94/3225.1808

SAMPLE RESULT VERIFICATION, DATA PACKAGE: B09332-TMA-611

Iodine-129

| Sample ID: | B09332 | B09333 | B09336 | QC-LCS | QC-BLANK | B09332-DU |
|---|---|---|---|---|---|---|
| Detector: | INGE1 | XSPEC14 | XSPEC14 | XSPEC15 | XSPEC14 | XSPEC14 |
| Count Time: | 203.9 | 465.33 | 899.68 | 401.85 | 788.93 | 1329.93 |
| Gross cpm: | 0.687 | 0.507 | 0.65 | 15.307 | 0.533 | 0.527 |
| Bkg cpm: | 0.787 | 0.508 | 0.779 | 0.909 | 0.496 | 0.59 |
| Blank cpm: | -0.004 | -0.027 | -0.155 | -0.101 | -0.155 | -0.053 |
| Net cpm: | -0.096 | 0.026 | 0.026 | 14.499 | -0.074 | -0.010 |
| Lambda: | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Corr. Days: | 91.37 | 49.01 | 52.82 | 0.00 | 0.00 | 54.46 |
| Decay: | 1 | 1 | 1 | 1 | 1 | 1 |
| Yield: | 0.6924 | 0.7646 | 0.7613 | 0.6957 | 0.6834 | 0.7322 |
| Aliquot: | 1 | 1 | 1 | 1 | 1 | 1 |
| PPT. Corr.: | 1 | 1 | 1 | 1 | 1 | 1 |
| Product: | 6.92E-01 | 7.65E-01 | 7.61E-01 | 6.96E-01 | 6.83E-01 | 7.32E-01 |
| P-factor: | 1.00 | 4.57 | 4.87 | 4.87 | 4.87 | 4.57 |
| Result Calc.: | -0.062 | 0.070 | 0.075 | 45.719 | -0.238 | -0.028 |
| Result Rptd.: | -0.063 | 0.070 | 0.075 | 45.700 | -0.237 | -0.028 |
| MDA Calc.: | 0.188 | 0.415 | 0.395 | 0.699 | 0.375 | 0.276 |
| MDA Rptd.: | 0.268 | 1.475 | 2.147 | 2.977 | 2.457 | 1.122 |